ELECTRICAL TIMES

THURSDAY
31 MAY
1951
SIXPENCE

FOR SPANS LIKE THIS AT 275 kV

USE

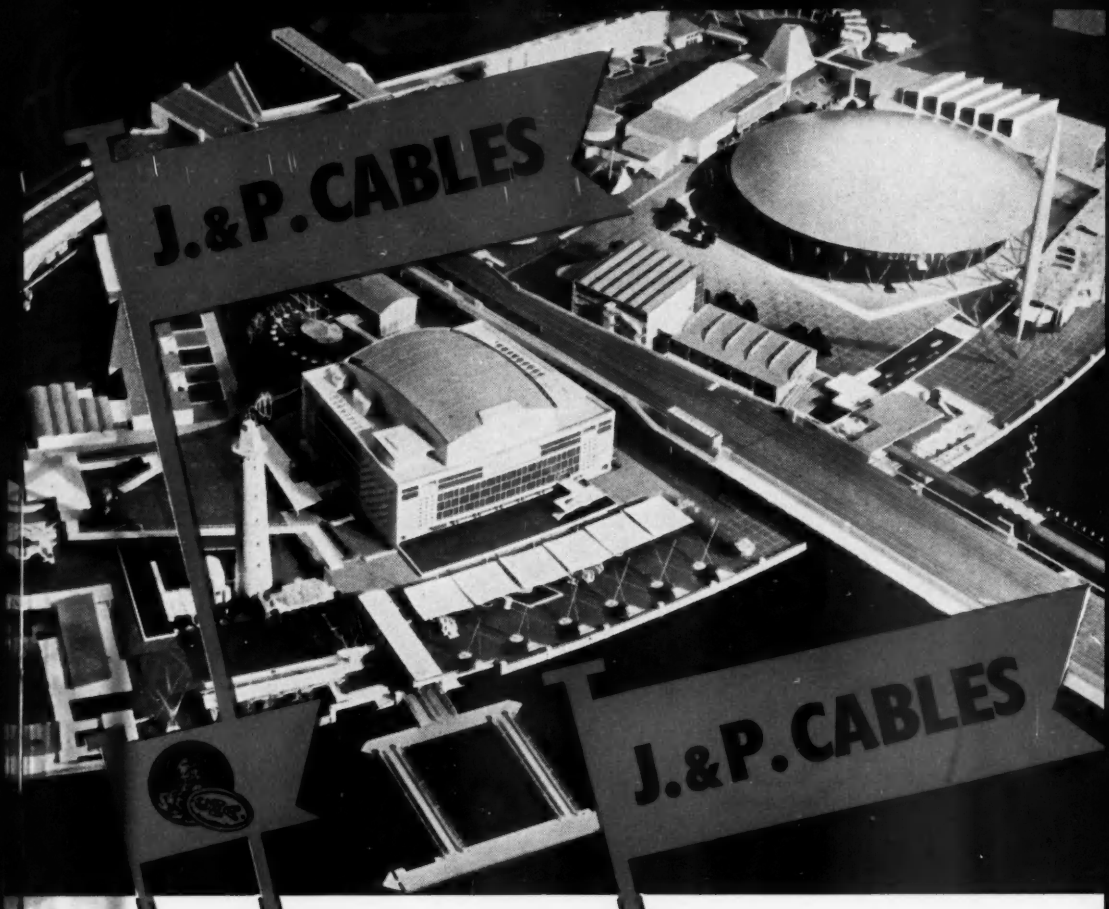
steel-cored ALUMINIUM CONDUCTOR

B.I. Callender's

BICC Steel-Cored Aluminium Conductor is being supplied for the British Electricity Authority's new 275 kV Super-Grid. The 22½ mile long Staythorpe - Barnby Moor section, comprising 99 towers supporting 1,000 ft. spans, is now under construction by BIC Construction Co. Ltd.

Because of its great tensile strength, lightness and relative high corona limit BICC Steel-Cored Aluminium Conductor has proved suitable for very high voltage lines on transmission systems all over the World.

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



J. & P. are foundation members of the C.M.A.

The London Electricity Board have installed a considerable quantity of J. & P. 660 v. P.I.L.C. Cable for the Festival of Britain South Bank Exhibition.

Consultants Messrs. McLellan & Partners.

JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7
The mark that means that "little more" in quality

A WORD TO THE WISE ABOUT L.S.E. MOTORS

Men with well-padded shoulders do not yet stand at street corners hissing "Psst ! Want any electric motors?", but it is no secret that motors are not now so readily available as they were a few months ago. It therefore behoves all prudent buyers to look well ahead, especially when (as befits far-sighted men) they insist on L.S.E.

Why do they insist on L.S.E. did you say! Briefly, because L.S.E. motors are first-rate machines, are backed by first-rate service, and are available in a range of types from which most needs can be met *exactly*.

The L.S.E. range includes:

Standard A.C. and D.C. motors in all enclosures and mountings. Special designs for mills, cranes, mines, etc. Variable speed equipments, A.C. and D.C.

Generators, frequency changers, welding generators, etc.

Marine electric motors, cargo winches, etc.

Control gear for all the above.

LAURENCE, SCOTT
& ELECTROMOTORS LTD

NORWICH · MANCHESTER · LONDON & BRANCHES

A

SPECIALISED LUBRICATION

Microtime Oils and **Greases** for Clocks, Meters, Fine Instruments and all Delicate Mechanisms. These oils possess extraordinary stability under extreme temperature conditions, do not spread, and give perfect lubrication over very long periods

also

Microloid Dry Lubricant — a quick-drying suspension of colloidal graphite in a non-inflammable carrier.

Descriptive literature on request from

BRITISH INDUSTRIAL PRODUCTS

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CLEARIT —

IN SHORT SUPPLY ★

'EVOLITE'

PERSPEX TUBES & CYLINDERS

★ *Except Against Government Contracts*

This is a position which will be corrected as soon as supplies permit.
In the meantime we INVITE ENQUIRIES FOR MACHINING OF PERSPEX and other materials.

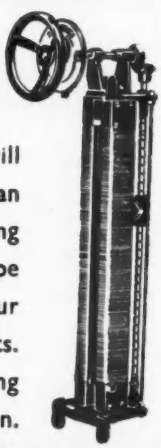
RICHARD DALEMAN LTD.

325/327 Latimer Road • London, W.10

Engineers in Perspex

SLIDING RESISTANCES

for all purposes



At a price you will approve, CRESSALL can supply you with a Sliding Resistance of the type and size to meet your particular requirements. Make a point of getting in touch with us soon.

CRESSALL

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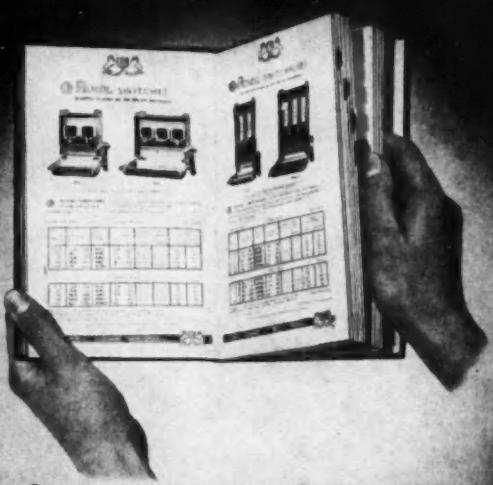
The CRESSALL MANUFACTURING CO. LTD.
Tower Street, Birmingham 19.
Telephone: ASTon Cross 2666 (3 lines). Telegrams: OHMIC, BIRMINGHAM



SWITCHGEAR CATALOGUE 11TH EDITION
ILLUSTRATES A COMPLETE RANGE OF
L.T. SWITCHES, SWITCHFUSES,
DISTRIBUTION BOARDS,
INDUSTRIAL PANELS AND SWITCH-PLUGS.

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BILL SWITCHGEAR LTD
ASTON LANE, PERRY BARR
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LONDON	BIRMINGHAM	N.MIDLANDS.	S.MIDLANDS.	N.WEST.	SOUTH	SCOTLAND
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Gateway in retirement

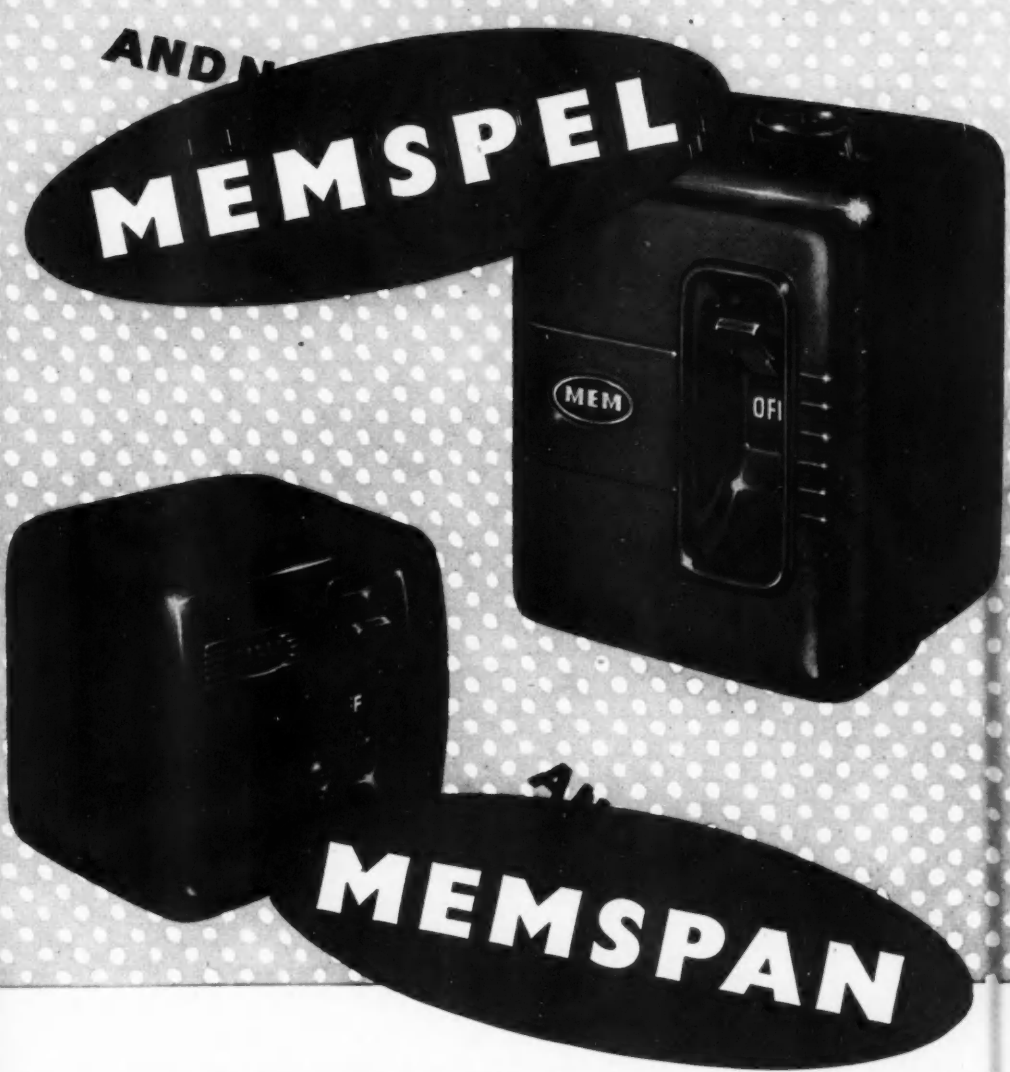
Temple Bar, Wren's famous gateway to the City of London, was put out to grass, so to speak, at Theobalds Park, not far from Bridge Works at Enfield, after doing yeoman service for 200 years. To the increasing volume of City traffic Temple Bar became an obstacle and the stern law of life is that obstacles, no matter how decorative, must be surmounted or removed.

We have a fine old time here with production obstacles and some of them take time to remove, causing delays in delivery. But you can be sure that we are doing all we can to see that you get your fair share of what we do make with as little delay as possible.

you can't beat a "Belling"

BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDLESEX. HOWARD 1212

CRC371



A new range of switchgear specifically designed for single pole and neutral applications

These new single pole and neutral switchfuses and splitters for A.C. circuits now take pride of place in the MEM range. The new units are designed specially for this duty, and are available in metalclad and all-insulated types. Everything about them is new. Check the features and see how well they meet your need.

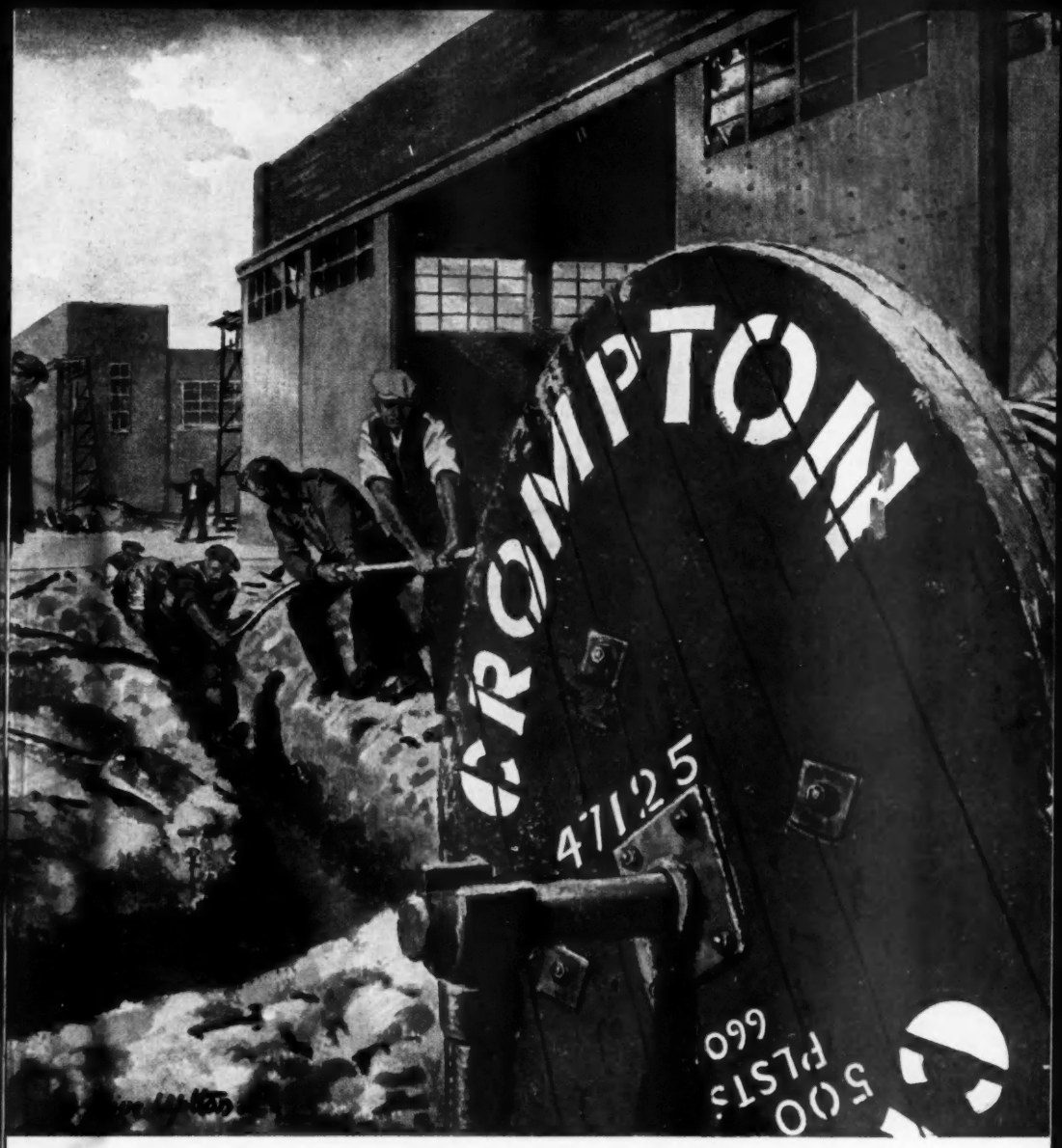
MEM

Send for the new Switchcraft Catalogue (List No. 311) for full details of the new range

1 Slow break A.C. switch.
2 Extreme compactness.
3 Choice of cartridge or rewirable fuses.
4 Fully interlocked.
5 Knockout bushes to simplify wiring.
6 All units comply generally with BS 861 and 816.
7 For use in A.C. circuits as required by I.E.E. Regulation 111. Tough rubber cable can be used to comply with I.E.E. Regulation 404 (J) (12th Edition).
8 Range includes 15, 30 and 60 amp switchfuses and a range of 2, 3 and 4 way splitters.

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM 11

Branches in London and Manchester.



GOING IN FOR A LONG INNINGS

Crompton

PAPER CABLE

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

Telephone : CHAncery 3333 *Telegrams : Crompark Estrand, London*

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- TUNGSTEN FILAMENT LAMPS
- TUNGSTEN LAMP FITTINGS
- FLUORESCENT LAMPS
- FLUORESCENT LIGHTING FITTINGS
- FLUORESCENT LIGHTING EQUIPMENT

The Ekco-Ensign Lighting Advisory Service is available to deal with any lighting problems requiring specialist advice. Architects and Contractors are invited to make full use of the facilities offered, which include designs, drawings and full-scale testing. Application should be made to the nearest Showroom or Sales Office listed below.

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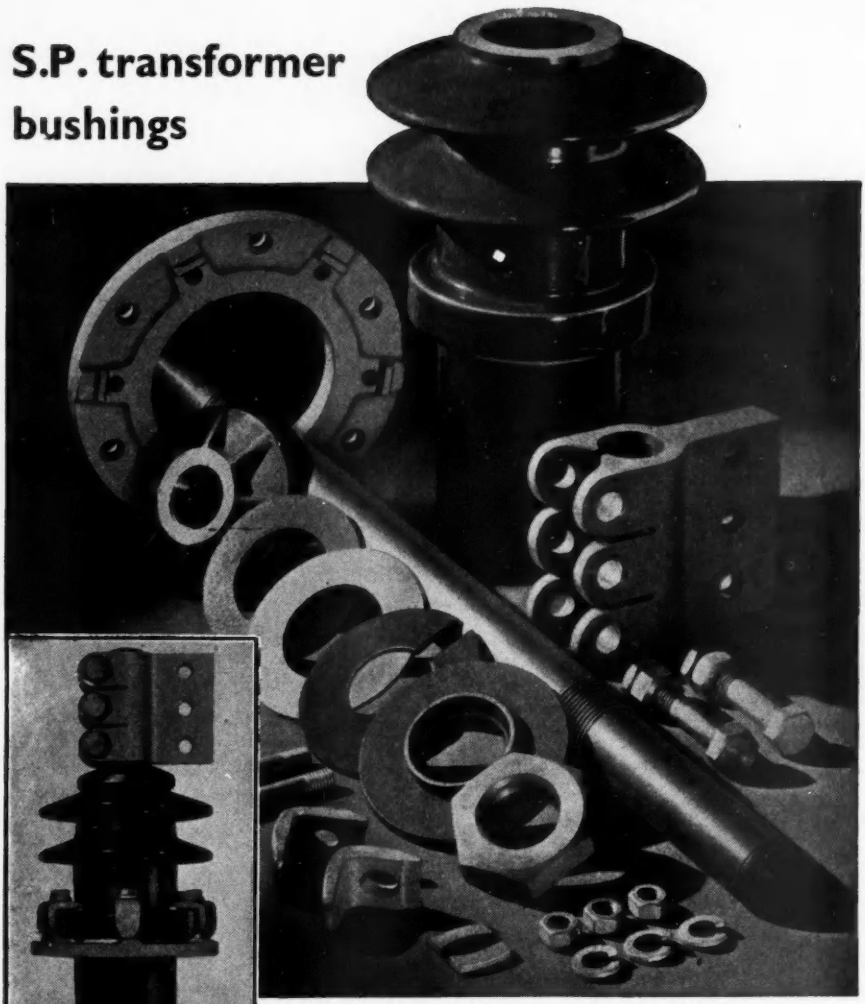
EKCO-ENSIGN ELECTRIC LTD., *Southend-on-Sea*

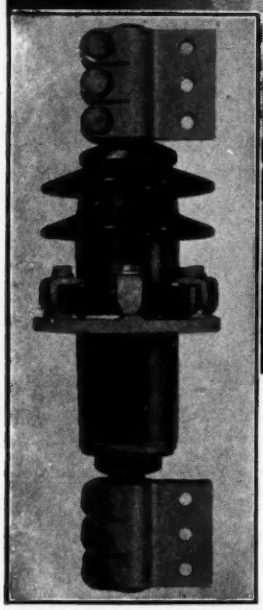
Phone: Southend 49491 *Telegrams: Ekco, Southend-on-Sea*

Visit our showrooms at 5 Vigo St., W.1. (*Two minutes from Piccadilly Circus*)

B

S.P. transformer bushings





Some of the components of a 6.6kV 1500 amp. bushing.

By the use of a complete range of interchangeable parts, standard bushings can be made up promptly for voltages from 600 volts to 88kV.

Current ratings from 150 to 1500 amps.

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S.P.45

DIRECT-ON-LINE STARTERS

for Squirrel-cage Induction Motors

Compact in size and robustly constructed, these starters protect the motor from harmful overheating, whilst ensuring maximum continuity in service.

THREE-PHASE RATINGS

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1/2 H.P. (100/250 v.),
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1/2 H.P. (400/550 v.).
Dimensions: 4 3/4" high x 3 7/8" wide x 3 1/4"

DOC.70

3 H.P. (200/250 v.),
4 H.P. (346/380 v.),
5 H.P. (400/550 v.).
Dimensions: 7" high x 5 5/8" wide x 4"

DOC.90

3 H.P. (200/250 v.),
5 H.P. (346/380 v.),
7 1/2 H.P. (400/550 v.).
Dimensions: 7 7/8" high x 7 1/8" wide x 4"

DELIVERY FROM STOCK

No manufacturer can offer a wider range of motor-control gear—hand or automatic, rheostatic or electronic—than BTH.

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BRITISH THOMSON-HOUSTON
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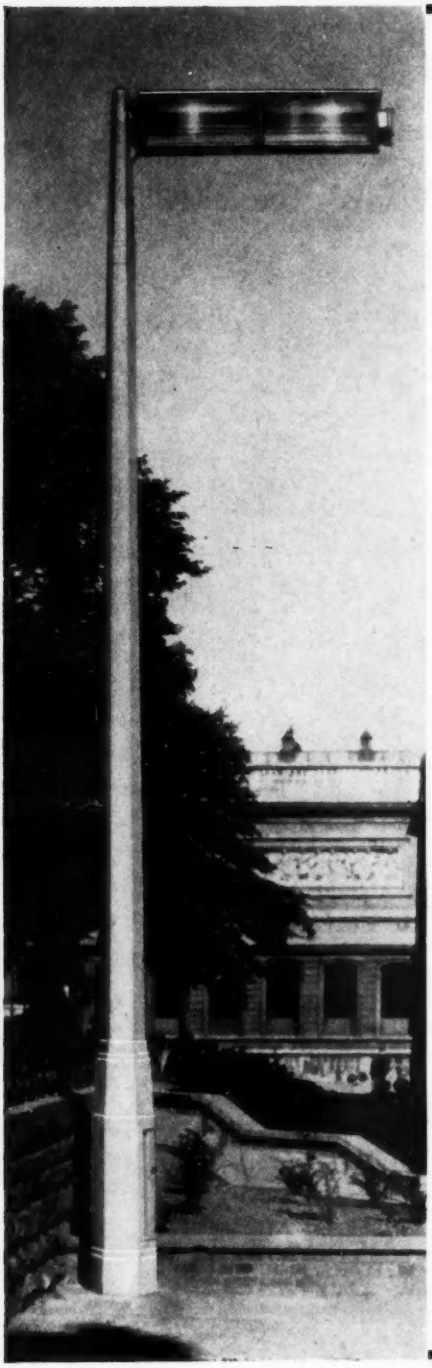
A4184

Member of the AEI group of companies



"Easy on the eye" by Night and Day . .

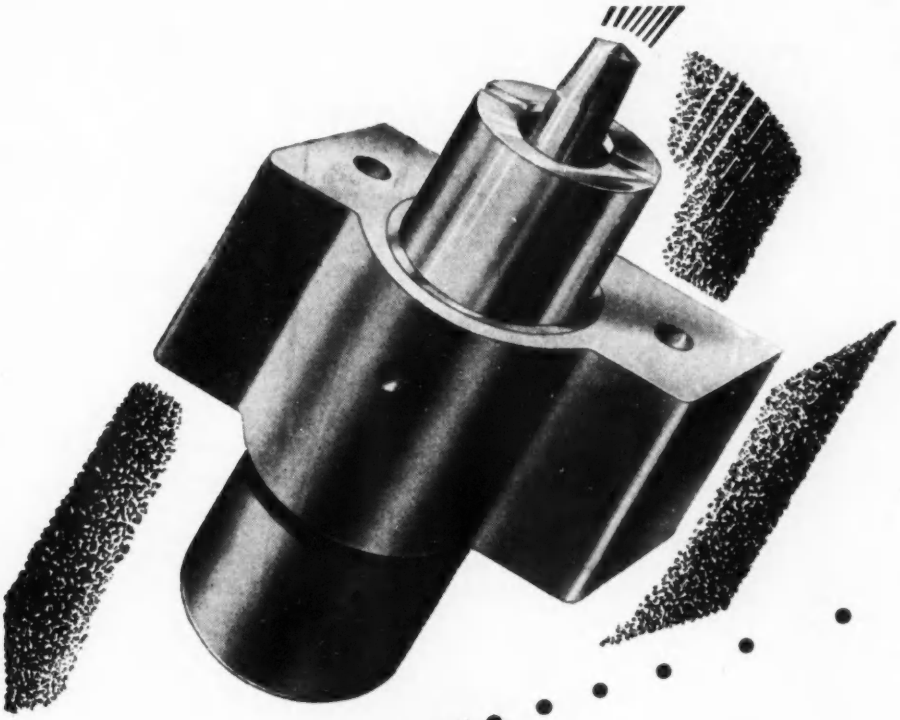
Revo street lighting fittings are designed to give uniformity of background brightness whilst at the same time eliminating all objectionable glare.

By day, they present an attractive appearance, especially when mounted on Revo artificial stone columns.

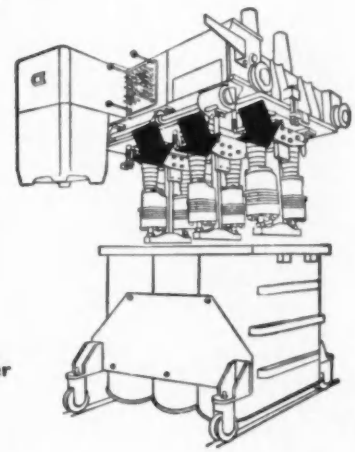
The example illustrated shows a "Sol-etern" lantern (for fluorescent lamps) on a "Phidias" standard, the latter being one of a series of Revo columns passed by the Royal Fine Art Commission.

REVO
REGD.

REVO ELECTRIC CO. LTD.
TIPTON - - STAFFS



Shock absorber



DASHPOTS—fitted to absorb the energy of the moving contact assembly at the end of the opening stroke, thereby minimising shock to the circuit breaker components generally.

A MECHANICAL feature of the VTP13/3 Oil Circuit Breaker

We will be pleased to send full information on this type of switchgear to interested executives and responsible officials.

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MEMBER OF THE AEI GROUP OF COMPANIES

Switchgear Specialists

MANCHESTER, 11. ENGLAND

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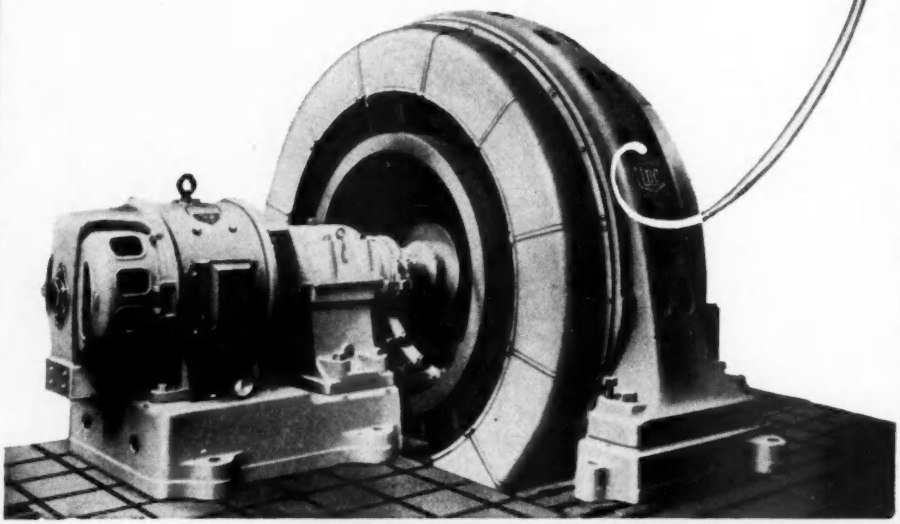
The Symbol of Power in Industry for over 50 Years

There is an L.D.C. motor of the correct enclosure, including Flameproof, for any industrial situation.

Illustration: L.D.C. Alternator with Exciter, continuously rated at 1,495 kW, 400 r.p.m., 6,900 v. 60 cycles 3 phase. Supplied to Ruston & Hornsby for Crown Agents, Bahamas.



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Simplex Electric Company Limited
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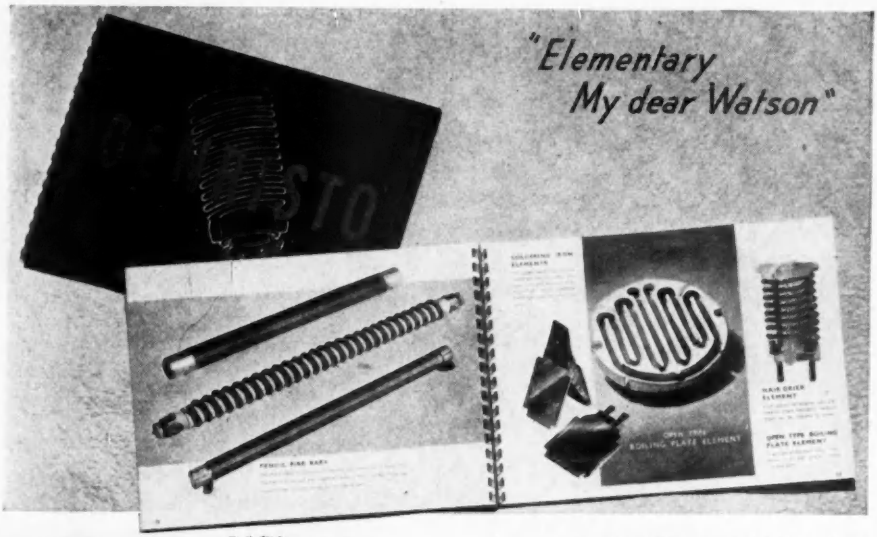

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If you want the best Elements, specify "Genristo." And a most useful first step is to send for the "Genristo" Catalogue, a handsome and useful booklet. Enquiries on business letter headings only.

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HEAVY DUTY LAMPHOLDER

that will reduce maintenance charges. Operate 10 amps continuously with safety.

Manufactured by

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'ENGLISH ELECTRIC'

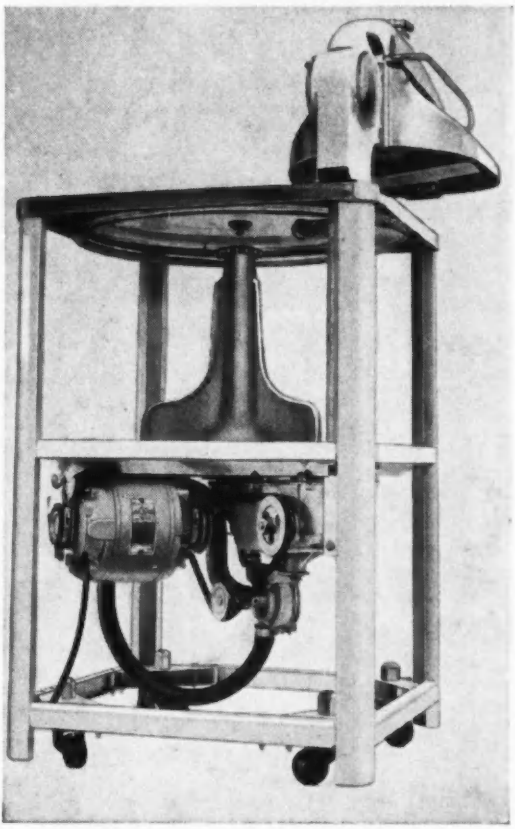
f.h.p. motors

Horsepower in the Home

'English Electric' F.H.P. Motors power some of the most advanced types of domestic equipment in current production. Illustrated is a high-torque single-phase, split-phase start drip-proof motor of ¼ h.p., specially designed for washing machine and similar applications. This example is flexibly mounted with a belt-tensioning device.

The English Electric Company manufactures a very comprehensive range of standard fractional motors, single and 3-phase AC with split-phase or capacitor start, and DC types. Alternative mountings and additional equipment, available as extras to most types and sizes of motor, confer great adaptability for new installations.

All 'English Electric' F.H.P. Motors are approved by the Canadian Standards Association (Approval 10648).



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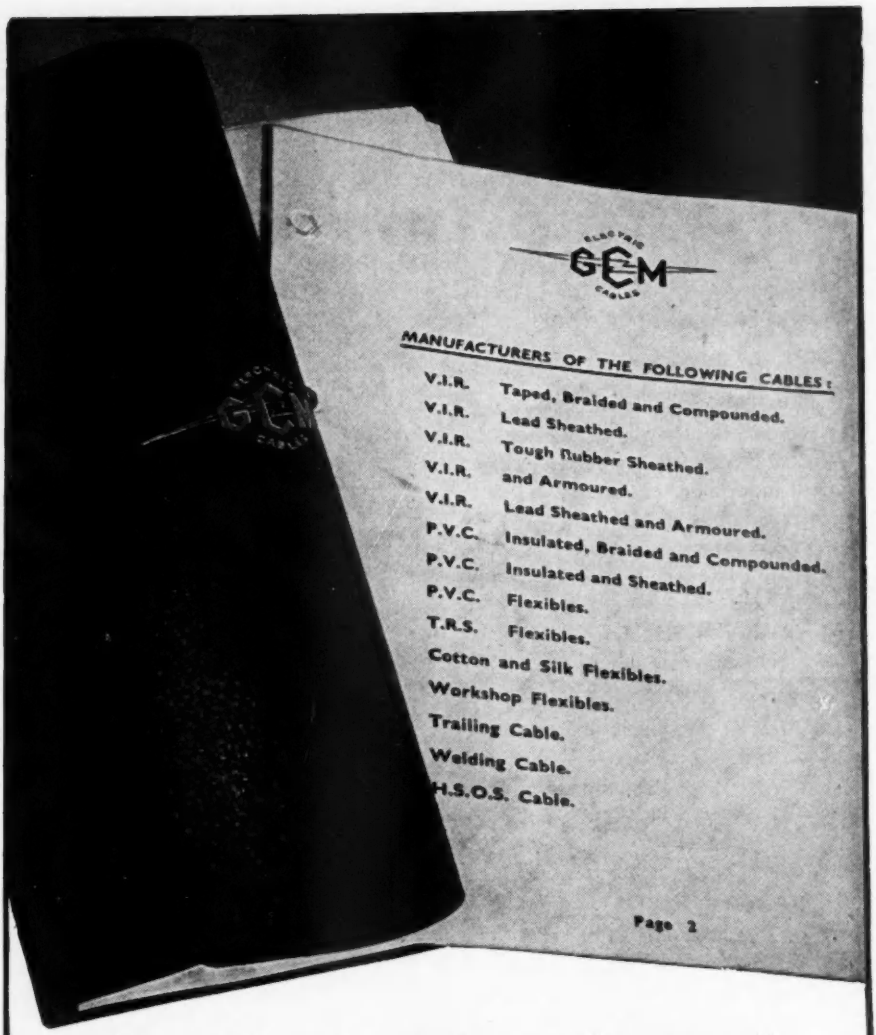
F.H.P. Motors Department, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

FHP.1



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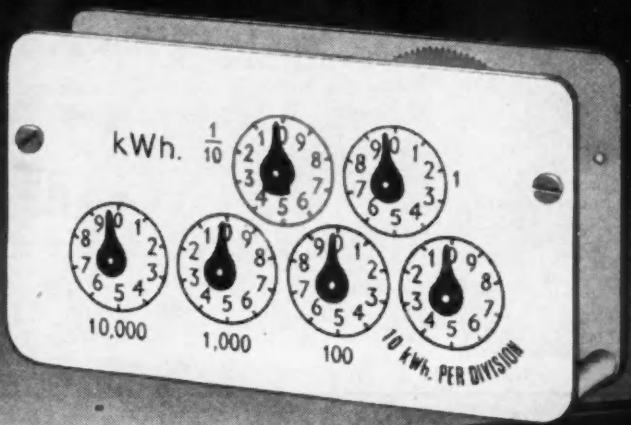

THE POINTER TRAIN

This registering mechanism is made of light alloys and has a very low friction level. The bearings have anodised surfaces and no lubricant is required.

This is but one of the many unique features of the Ferranti F.M. Meter, epitomising the cumulative experience of over 60 years of meter design and manufacture.

FM95

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Legg Industries Limited design and manufacture Charging Equipment for Electric Vehicles and Trucks of all types, and the majority of leading manufacturers specify LEGG CHARGERS for use with their equipment—both at Home and Abroad.

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Controls you do need!

TYPE R. ROOM THERMOSTAT

For domestic and industrial applications. Range 48°-72° F. or 40°-80° F.

Capacity: 15 amperes, A.C.

A very attractive precision instrument with neat grey moulded cover, harmonising with any scheme of decoration, and control knob in maroon.

For greenhouse or factory use a watertight model with cast aluminium cover is available.

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56 VICTORIA STREET, ST. ALBANS, HERTS.

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Never does friction's fretful pain,

Curb carefree 'horses' such as these,

YOUR horses' power may likewise gain,

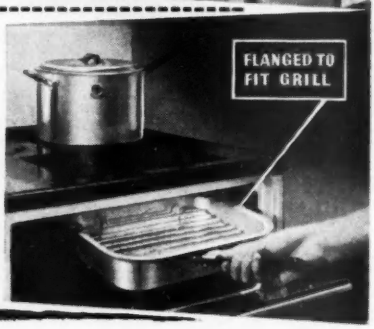
By wider use of FBC's.

FBC
TRADE MARK
ALL-BRITISH
ball and roller bearings

FISCHER BEARINGS COMPANY LTD. WOLVERHAMPTON. *Subsidiary of British Timken Ltd.*

DUAL PURPOSE GRILL FRYPAN

The new Pyramid dual-purpose grill-frypan fits any standard post-war grill. With wire grid it is an efficient and enduring grill pan—while the Pyramid special construction gives it a ¼ in. thick base, guaranteed against distortion and making it an admirable frypan. Thus, one pan does the work of two.
This is the first pan specially designed to meet the needs of those good cooks who first grill and then fry in order to economise in both fat and time.
The grill-frypan has wide corners for easy cleaning and is fitted with the special PYRAMID heat-resisting and insulated Bakelite handle.



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PYRAMID WORKS, BIRMINGHAM 1.

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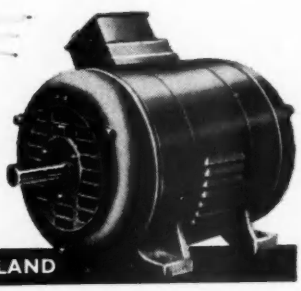
TILLING-STEVENS Motors are the most economical and efficient means of providing *on the spot* driving power for all agricultural and industrial purposes. Reliable, flexible and smooth in operation, they effect savings that quickly pay for their installation. Write for details on motors for single and three-phase supplies.



TILLING-STEVENS
Electric Motors
TILLING-STEVENS LIMITED · MAIDSTONE · ENGLAND

Even the most enthusiastic advocates of B.S. 1363 could hardly have foreseen the extent to which the new standard would be adopted in a matter of only three years. From Perth to Penzance, from Lowestoft to Llandudno 13 amp. plugs and sockets have been specified and installed. Practically every new dwelling has them, and most of them were made at Edmonton. 730 is a number well-known to contractors all over the Country, for 730 is the most popular 13 amp. socket today. And now we are introducing a switched version of the 730. We are sure it will merit an equal popularity where specifications call for 13 amp. *switch*sockets. Make a note of the number — 2957.

Steel Box to B.S. 1363: 1947 for 13 amp. flush types — M.K. List No. 885. Also in this range :— List No. 2959 — 13 amp. Surface All-Insulated switchsocket. List No. 2977 — 13 amp. Surface Metalclad switchsocket in drawn steel seamless box.

M.K. ELECTRIC LIMITED

WAKEFIELD STREET, EDMONTON, LONDON, N.18

Telephone—Tottenham 5151 (6 lines) Telegrams—Multiconta, Southtot, London

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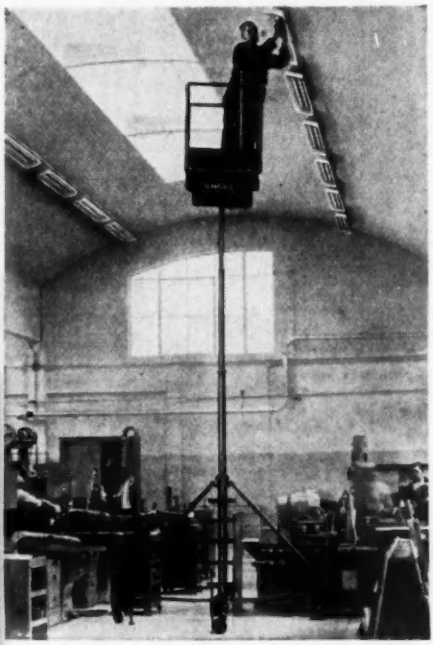

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with the famous

BEANSTALK

(Trade Mark)

Maintenance of plant and buildings is safer and quicker—makes previously difficult places now easily accessible. Standard model provides the operator with a working height of 23-25 feet yet when retracted the BEANSTALK can be pushed through an ordinary small door. Alternative BEANSTALKS now available: 30 foot working height model, trailer type, baby model with 18 foot working height, and model with umbrella framework for conveying in small lifts. All models can be power operated if required.

We will gladly demonstrate this equipment at your works by appointment.

Write for full illustrated particulars to:

WM. MOSS & SONS Ltd.

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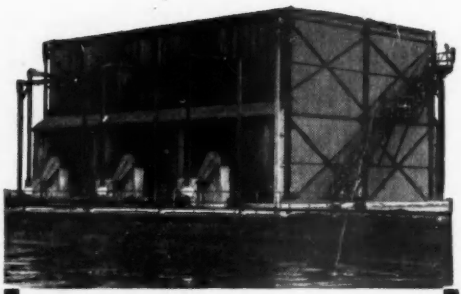

Premier Cooling Towers

are being used in all parts of the world under widely varying conditions and giving entire satisfaction. Their special design and construction makes them the most efficient tower of the present day.

THE
PREMIER COOLER & ENGINEERING CO., LTD.
Shalford Nr. Guildford Surrey.

DECO CABLE REELING DRUMS

for all moving structures

DECO Electrical Products Include

Contact Collector Columns, Limit Switches, Overhead Collector Equipment, Winch Limiting Mechanisms for Skip Hoists, Cranes and Mechanical Handling Plants, Cable Reeling Drums

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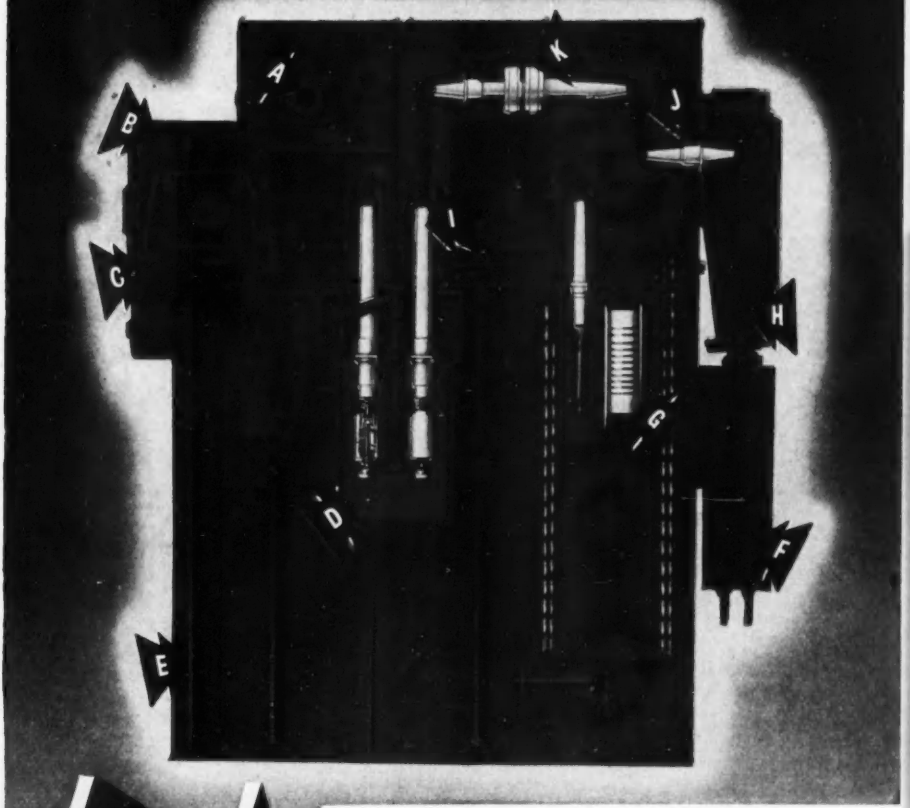
P370

The finer points of SWITCHGEAR DESIGN



HEAVY DUTY METALCLAD SWITCHGEAR

A Condenser bushing busbars
B Continuous trunking for bus wiring
C Door giving access to the ancillary apparatus
D Low oil content circuit breaker
E Roller shutter enclosing front of the unit
F Multi-core cable box conveniently situated behind unit
G Voltage transformer
H Cable boxes suitable for all types of cable
I Isolating contacts in vertical porcelain spout insulators
J Oil-filled connecting chambers facilitate removal of current transformers
K Current transformers mounted on condenser bushings are readily accessible

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The oven thermostat

WITH FLEXIBLE DRIVE

Some just happen; this one was designed . . . . designed to cut out the snags . . . designed for minimum maintenance . . . designed (note the flexible drive) for easy fitting . . . designed – and made – by people who know.

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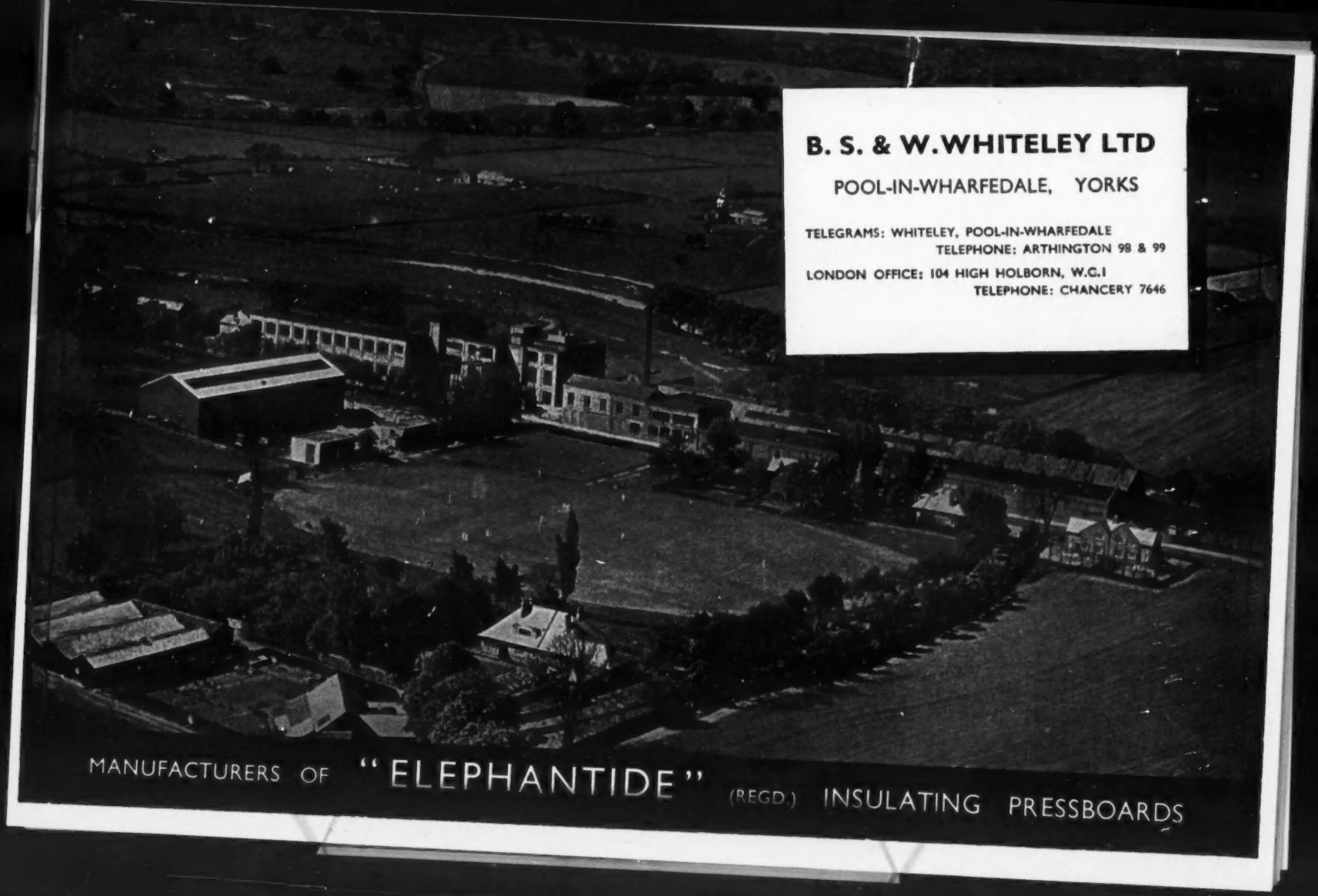
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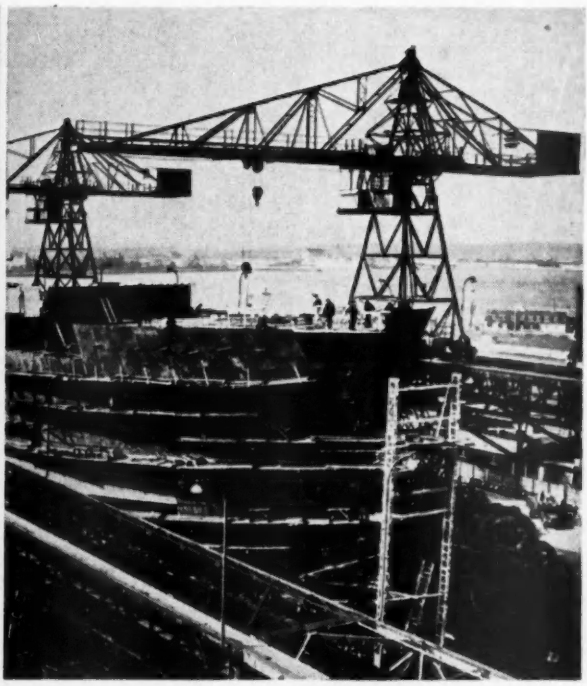

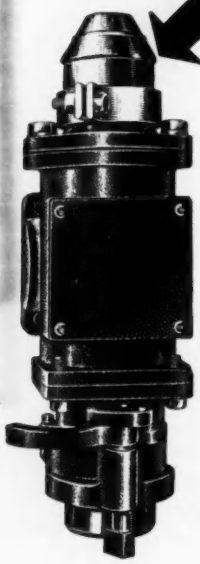

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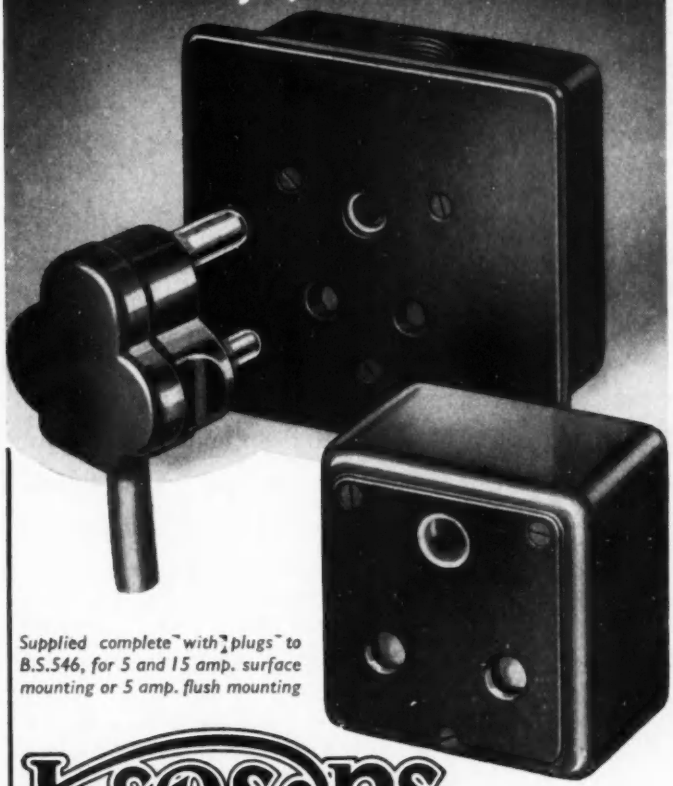
Safety Convenience Appearance Reliability



Supplied complete with plugs to B.S.546, for 5 and 15 amp. surface mounting or 5 amp. flush mounting

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and ensure these advantages:

SAFETY

Kersons 'Quail-Shutter' 100% safety device prevents unorthodox contact with "live" socket tubes

CONVENIENCE

Small and compact — ideal for convenient service at every usage point

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Attractively designed moulded covers and plates, free of dust traps

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THE KERSONS MANUFACTURING CO. LTD.
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for the *new* House of Commons

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These batteries were installed with the approval of the Ministry of Works.

A PRODUCT OF CHLORIDE BATTERIES LIMITED

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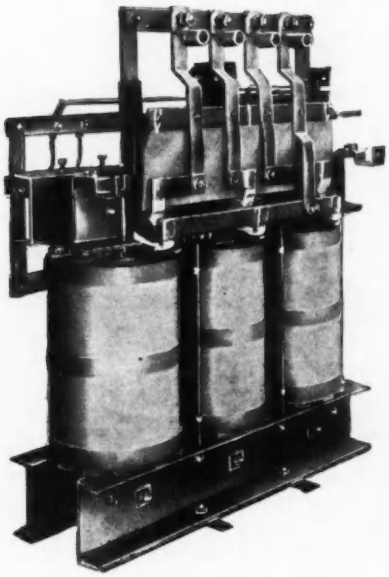
MAKERS OF EXIDE BATTERIES

S.62

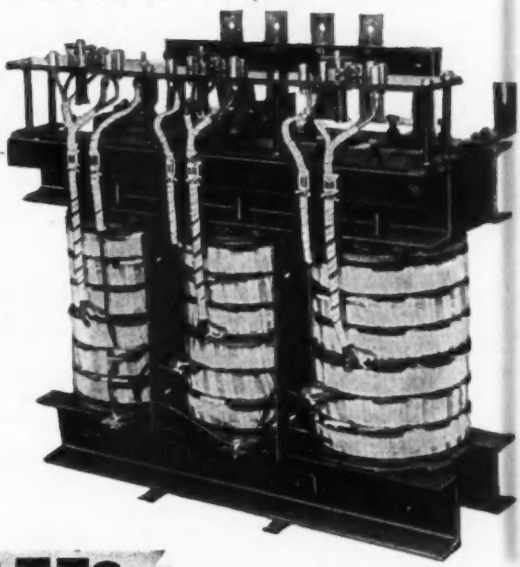
LINDLEY THOMPSON *Core Type* TRANSFORMERS



600 *kVA*, 3-*phase*, 50 *cycles*.
Voltage ratio 6,600-433.
With off-load tapping switch.

Nothing has been overlooked in the manufacture of these Core Type Transformers. Winding, cooling, insulation, drying . . . every factor which makes for the utmost efficiency has been considered.

The functions and characteristic features of these Units are fully described in the Brochure of the LINDLEY THOMPSON TRANSFORMER & SERVICE CO. LTD. A copy will gladly be sent to any Electrical Engineer or Executive who requests it.



100 *kVA*, 3-*phase*, 50 *cycles*.
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IMMERSION HEATERS

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CIRCULATORS

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LOADINGS available in 2, 3 and 4 kW

IMMERSION HEATERS from 12" to 42"

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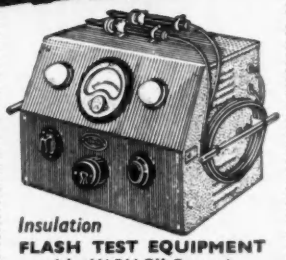

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with "VARIAC" Control

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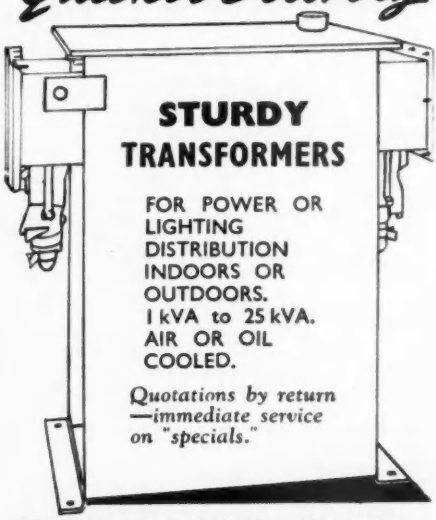

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1 kVA to 25 kVA.
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1851

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W. T. H. undertakes to erect Telegraph Works, in this country or abroad, at a very reduced charge, and, if required, keep them in order; or when Railway Companies or others wish to erect their own Wires, he will supply them with Instruments of first-rate quality, as he has lately done (on Cook and Wheatstone's principle) to the South-Eastern Railway Company, for the Reading, Reigate, and Guildford and Hastings and Ashford Lines—the Telegraph Company being paid for a Licence for using the Patent. W. HENLEY also calls attention to his Magneto-Electric Telegraph, the Patents for which he has assigned to the Magneto-Electric Telegraph Company. This Instrument requires no battery, and is the only Telegraph not affected by weather or bad insulation of any kind.

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Wire, covered with Silk, Cotton, Gutta Percha, or India-rubber, of any size or in any length. [1260

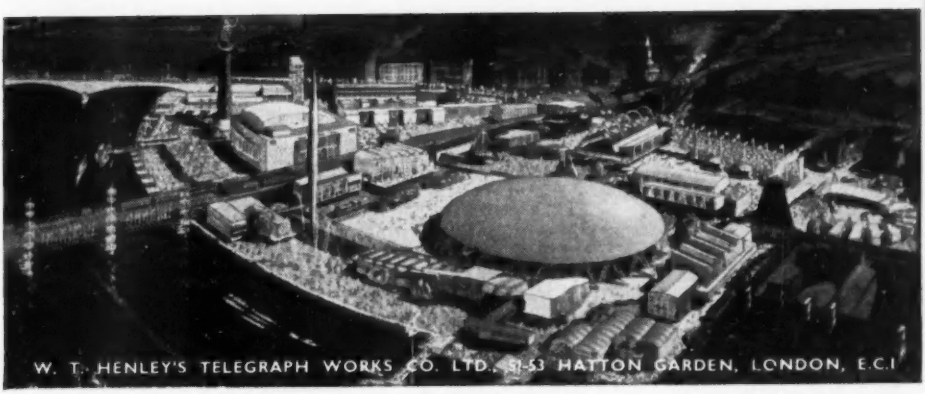
The Council Medal awarded to W. T. Henley at the Great Exhibition 1851. (A contemporary advertisement is reproduced on the left).

WILLIAM THOMAS HENLEY, who commenced the manufacture of insulated wires as early as 1837, gained one of the coveted Council Medals awarded at the Great Exhibition of 1851 to manufacturers whose products showed outstanding originality, as well as the highest standard of excellence.

HENLEY Wires and Cables have been used extensively for the Festival electrical installation work and several HENLEY products have been selected for display.

1951 HENLEY CABLES

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS



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the best answer is BRUSH

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15 72

Copper was well in the industrial picture in 1851. Tons of Copper were used in the G.W.R. express locomotive shown at the Great Exhibition.

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Copper has always been in the forefront of the industrial picture. And now, in these times of raw material shortages, it is more than ever important to ensure the most efficient use of copper and its large family of alloys. The Copper Development Association, a non-trading organisation, backed by the full resources of the British copper industry, exists solely to help copper to help you. A sound opinion on everything that copper can or cannot do is obtainable without charge or obligation simply by asking the C.D.A.

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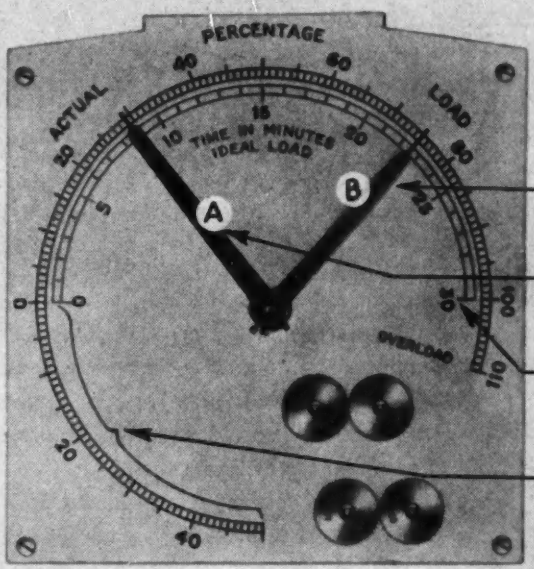

This pointer shows the load you must not exceed.

This pointer shows the the load you are taking.

Pointer B resets to O on reaching this position.

Pointer A resets to a pre-arranged point on this scale at end of each half-hour period.

If pointer (A) overtakes pointer (B) during any ½ hour period—load must be shed, until pointers are running together.

(1) An audible warning calls attention to the need for this to be done—

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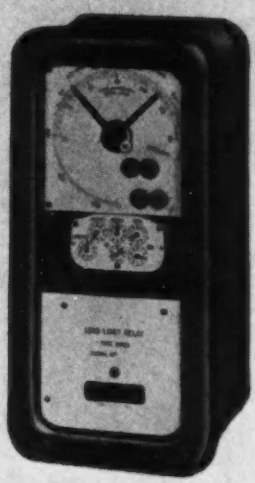
(2) —relays operate to effect automatic load reduction.



. . . with

the Metrovick

LOAD LIMITER

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METROVICK *for Instruments, Meters and Relays*

FOR LABORATORY AND TEST ROOM PRECISION MEASUREMENTS

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The range of portable instruments and test sets also includes dynamometer, moving coil and moving iron types for electrical laboratory and industrial purposes.

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For industrial and research applications for the measurement of volts, amps, watts, kVA, frequency, power factor, etc.

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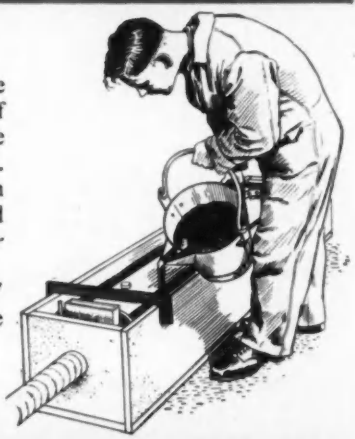
Let us send you Publication No.257W giving full technical information on the range of BICC Joint Box Compounds.



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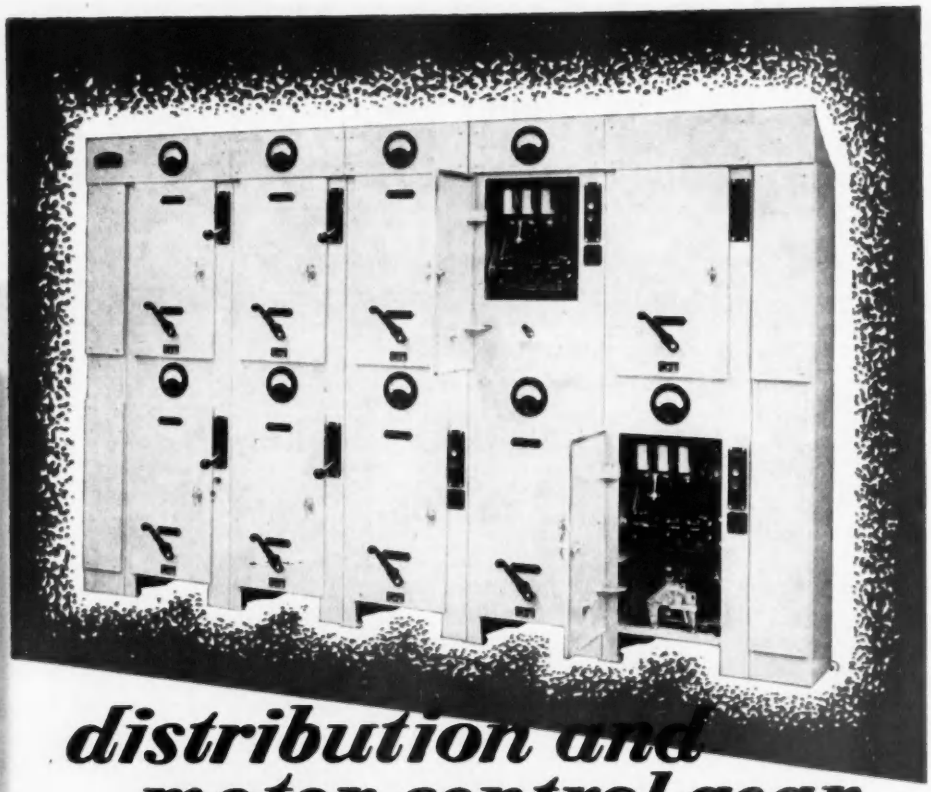
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2



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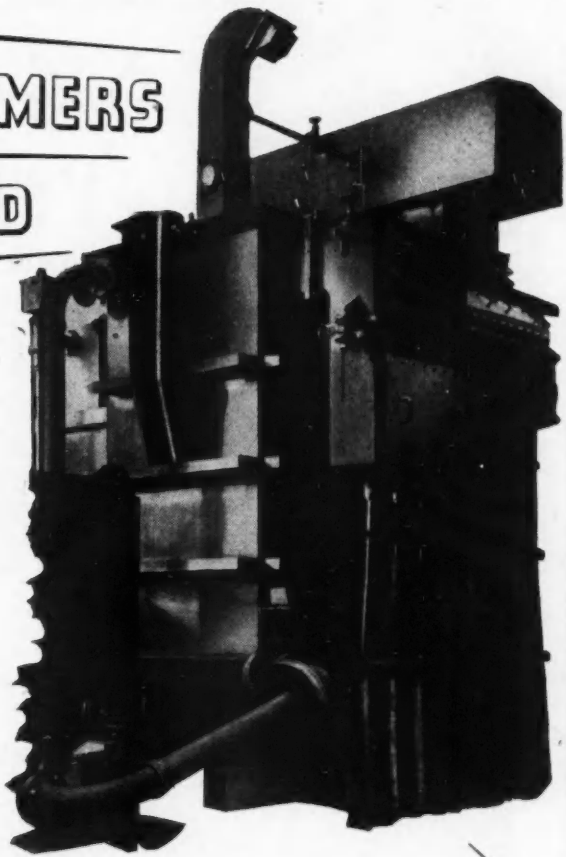

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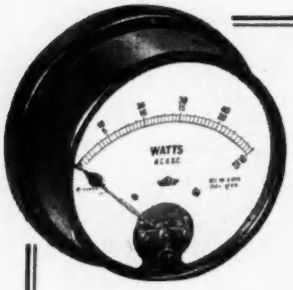

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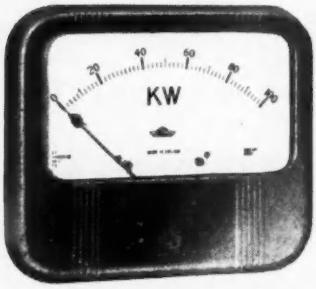

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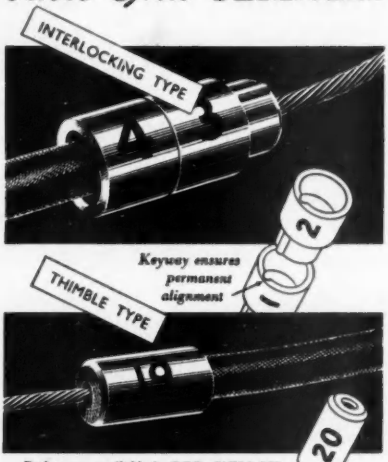

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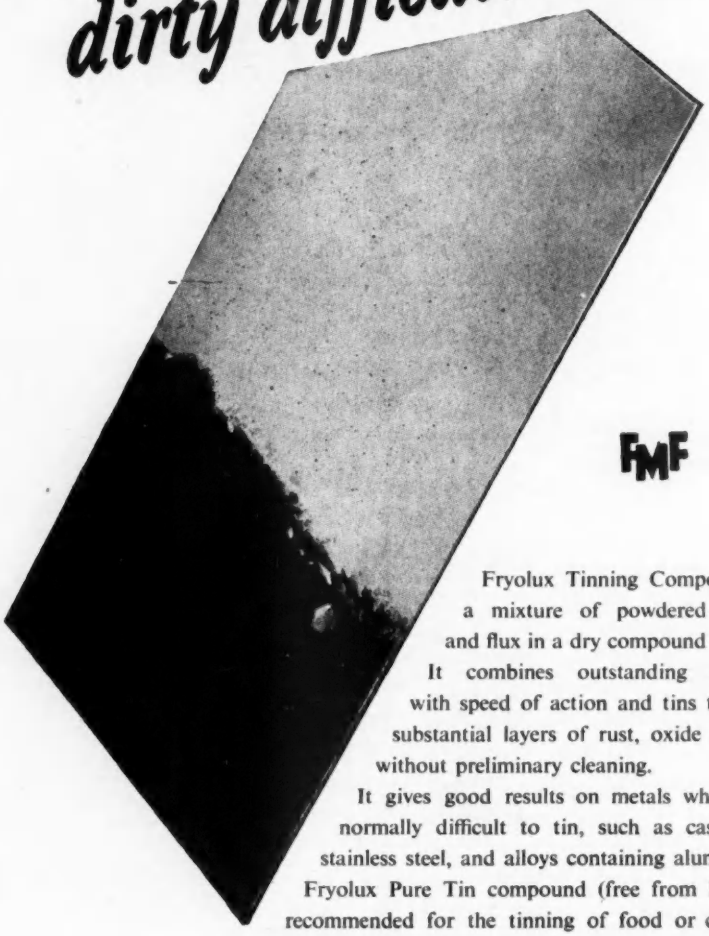
Tinning dirty difficult metals



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Fryolux Tinning Compound is a mixture of powdered solder and flux in a dry compound or salt. It combines outstanding activity with speed of action and tins through substantial layers of rust, oxide or dirt without preliminary cleaning.

It gives good results on metals which are normally difficult to tin, such as cast iron, stainless steel, and alloys containing aluminium. Fryolux Pure Tin compound (free from lead) is recommended for the tinning of food or cooking utensils where freedom from lead is necessary.

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ELECTRICAL TIMES

Vol. 119 No. 3108 THURSDAY 31 MAY, 1951

SIXTIETH YEAR OF PUBLICATION

PUBLISHED EVERY THURSDAY

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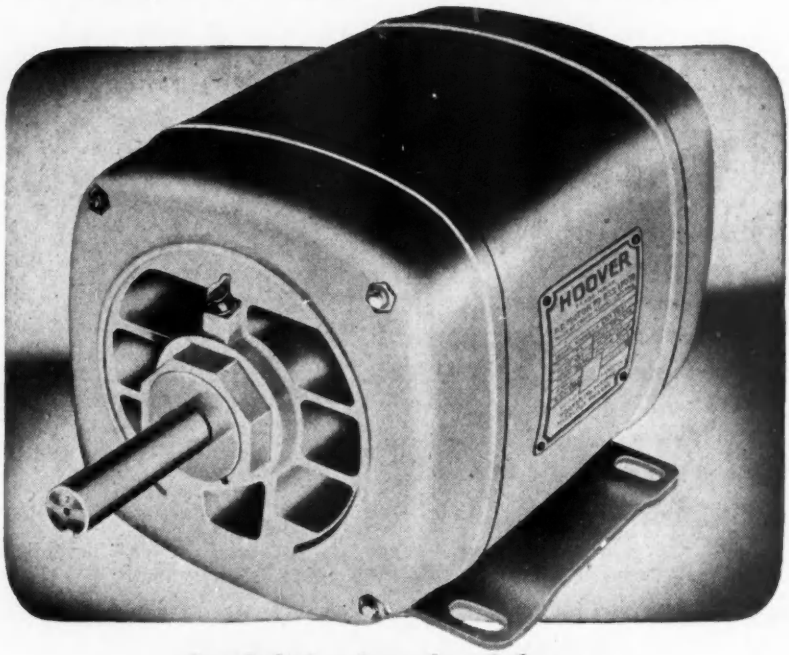

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All sections of industry agree that the new Hoover F.H.P. Motor is easily the most advanced of its kind available.

Such general admiration can be attributed to the outstanding all-round performance of the new "Fractional", the quality of its construction and the superiority of its styling.

In addition to these advantages, the new motor is backed by a special Hoover 5-point Service Plan, providing users with facilities for both service and advice at their factories or workshops anywhere in the country.

That is why so many manufacturers are choosing the new Hoover F.H.P. Motor for inclusion in their products.

HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT

CAMBUSLANG · LANARKSHIRE · SCOTLAND

Editorial

MINOR PROPHETS

WHO are the pioneers of the electrical industry? Faraday, Volta, Arago or, more recently Edison, Swan, Ferranti, Crompton —all these and a score of others have their names indelibly inscribed in the roll of the industry. Their place is secure for ever. But what of those whose achievements were less spectacular, whose contribution consisted in the development of one instrument, process or technique. Do we nowadays speak of a "Braun" tube when we refer to cathode rays? Or a Poulsen wire recorder? For this reason, Meteor welcomes the recent publications of the Cambridge Instrument Company which, commencing as a general review of fifty years of scientific instruments are developing into scientific monographs on the evolution of particular types of instrument. The series is yet scanty—but there seems to be ample scope for many more.

SIR HENRY SPEAKS OUT

NATIONALISED bodies which have been set up in the last few years, have created special problems in the sphere of organisation. A study is being made of existing structures by the authorities, but some critics consider a fuller investigation is necessary, since these large monopolies are so far greater in magnitude than even the largest former operating unit. Consequently any review of organisation by such an authority as Sir Henry Self must rank of first class importance, and certainly this is so of his recently published address given before the British Institute of Management. In particular his courageous defence of increased paperwork caught Meteor's eye. In such an organisation it cannot be gainsaid that the amount of circulating paper must be considerable, but can Sir Henry say that all of it is necessary or even desirable? The right to issue instructions, memoranda and the like should be zealously guarded and delegated only to most competent persons. A second question which Sir Henry raises is the position of the sub-areas. The ultimate part that these groups will have to play has by no means been determined, and is a matter which the B.E.A. is believed to be giving special attention. Less is heard now from the advocates of a two-tier structure, nevertheless it is inevitable that some duplication of work takes place at sub-area level, and it is advisable to see that this is kept well within bounds.

THE FLESH OF ORGANISATION

AS a thesis on organisation Sir Henry Self's address was excellent, but it was difficult to escape a feeling that the whole question was considered as an integral subject, a separate entity, and not as no more than a means to an end. The test applied was administrative efficiency which, important in itself, is far from synonymous with service to the consumer. Legally we may have dropped that phrase, "a cheap and abundant supply of electricity," but nevertheless, this should still be our ultimate goal; it is the final test by which nationalisation will stand or fall. To achieve this requires a living organism of which administrative structure is but the skeleton; this must be clothed with staff, and, however excellent the framework, it will be no less or no greater than the sum total of the persons which comprise it. Therefore, to consider organisation as an abstract subject, divorced from the human side of management will inevitably lead to undue regimentation and may be dangerous to a body whose commercial activities have the fullest need for initiative and drive. The raw material of our industry is manpower; its end product, consumer service. These are the ultimate factors which must be kept constantly in mind if the industry is to retain its proper sense of direction.

STEP BY STEP

SIR EDWARD MACCOLL'S, I.E.E. lecture on Scottish hydro-electric schemes was an outstandingly interesting story of the development of a country's natural power;

It is with regret we announce that the rapid rise in paper and production costs will compel us to increase the price of the "Electrical Times" to ninepence from next week. Prepaid subscriptions will continue without change until expiry

it must have struck most of the large audience also, as a notable illustration of the dangers that accompany detailed long term planning. Experience in the design and construction of water power schemes was plentiful when the North of Scotland H.E. Board was constituted in 1943, and it was fully applied when the various constructional schemes were drawn up. Unfortunately the economic and social conditions that were to prevail in a post-war, mid-century Britain, were not so surely known, and these conditions have proved, in the long run, as important as the precise engineering calculations. Difficulties in obtaining cement have now caused the Board to look to rock-fill dams rather than the buttress and mass-concrete types specified earlier; aesthetics of building dimensions and the difficulty of co-ordinatting mechanical and civil engineering work have been factors combining to encourage the use of horizontal rather than vertical turbines; and remote control of groups of stations has been supported, not so much by ideas of economy and operating convenience as by human considerations that make it inadvisable to constitute power station staffs and their families as an isolated community. The moral of the story lies in the very fact that the North of Scotland Board is able to make the changes. It is the old precept—progress step by step, retaining maximum flexibility.

LIGHTING DEVELOPMENT

IT seems almost paradoxical to realise that the supply industry, which was founded on supply for lighting, should now be considering the intensive development of its one-time peak load to increase its load factor. Nevertheless, the reception given to Mr. Robinson's paper at the E.D.A. Sales Management conference showed general agreement with his ideas. There is one point, however, which requires particular emphasis, since it seems to be the peg upon which the whole scheme will hang. The public must be educated to distinguish the difference between peak-lopping and fuel saving. Recent correspondence in the popular press showed pretty plainly that cold breakfasts were associated with Festival floodlighting in the minds of far too many people, and the newspapers who printed their letters without explanation or even giving space to B.E.A. statements, missed an opportunity of performing a public service. The Ministry of Fuel themselves, must bear a major portion of the blame for this confused thinking on the part of the man-in-the-street. The ban on advertisement lighting last January imposed for psychological reasons as part of the save fuel programme, came at a time when peak loads and shedding were uppermost in people's minds. There was little effort made to differentiate these two separate problems, yet this must be done before the industry can make any progress towards filling the valleys.

FESTIVAL TIME

IN his celebrated experiment on the sea shore King Canute, besides earning undying fame, conclusively proved that tide at least waited for no man. The question of halting time, however, has seldom been put to the direct test. Such an idea might seem an anathema to the N.P.L. with their crystal clocks, so accurate that they make even the sun itself clock-in on time. Yet all such accuracy proved unable to withstand the blandishments of Mr. Morrison when he deemed time should stop for 17 months. The N.P.L. jubilee that should have been held in January, 1950, was delayed until May, 1951, so as to synchronise with the Festival of Britain. Here is an achievement indeed; to make an organisation measuring time with a consistency of a few parts in one hundred thousand million over an hour, content to accept tamely an error of near 3% in 50 years. No doubt our scientists are working out the political variation factor and in future, jubilees may be expressed as $50 \pm fx$, where x is the unknown political expediency and f is a festival function.

Meteor

Developments in METAL RECTIFIERS

Present Day Practice reviewed

By G. E. B. WHITE,* A.M.I.E.E., D.I.C., M.A.E.T.

A RECTIFIER is normally defined as a device which permits current to pass more freely in one direction than in the other, so that by connecting a number of units in various ways, a.c. energy may be transformed into d.c. Although many types of rectifiers employing chemical, electronic and electro-mechanical principles have been designed, no really reliable, simple and efficient static method was available until the Westinghouse copper-oxide rectifier was introduced on a commercial scale in 1927. Since that date, development has been extensive, and rectifiers have been built ranging from 500 kV at low current to 12,000 amps at low voltage.

Selenium rectifiers were being developed in the late 30's, but these suffered from the serious handicap of reverse instability. The problem was tackled in the research laboratories of the Westinghouse Company and resulted in the introduction in 1939 of their "Westalite" rectifier, a selenium compound unit, having a better forward characteristic, improved reverse stability, and produced by more efficient methods.

Research still continued, however, and a natural development was the double-voltage rectifier, which has an efficiency of about 90% and has enabled much higher power rectifiers to be built. The actual economic limit is dependent upon a number of factors, but outputs as high as 1,000 kW are practicable in suitable circumstances. A further development is the quadruple-voltage rectifier, specially designed for high-voltage, low-current applications.

Reverse Characteristics

The symbol for a rectifier is a half-arrow indicating that current may be assumed to flow readily in the direction of the half-arrow, but with difficulty in the opposite direction. There is a small voltage drop in the "go" or "forward" direction, and there is also a minute current leakage in the "stop" or "reverse" direction. These values depend on a large

* Westinghouse Brake & Signal Co., Ltd.

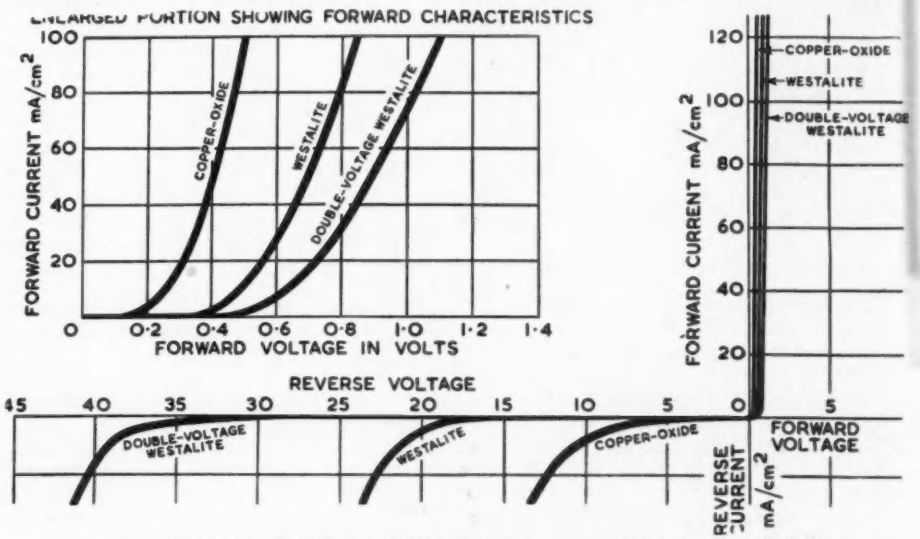


Fig. 1. Comparative volt-ampere characteristics of copper-oxide and selenium units

number of independent variables and make it impossible to express the internal resistance of the rectifier in terms of ohms as it has no constant value over a given current range, this property being used in a large number of circuits.

The four types of metal rectifier already mentioned all exhibit the same shape of voltage/current characteristic, shown in Fig. 1. The scale of the voltage and current characteristics differ, but their relative shapes are the same.

If the forward current through the "go" direction of a metal rectifier is plotted against voltage, it will be seen that no current flows until the voltage has built up to a certain minimum figure, largely dependent on the type of metal rectifier under test. Beyond this point the current rapidly increases until the voltage/current characteristics becomes a straight line with a steep upward slope. This straight line may be continued indefinitely there being no saturation point as in the case of a thermionic valve. An examination of the reverse characteristic reveals the same trend.

Copper-Oxide Units

The rectifier element consists of a copper disc or washer, one side of which is oxidised by a thermal process to produce a thin firmly adhering layer of cuprous oxide. Current flows more readily from the oxide layer into the copper than in the opposite direction.

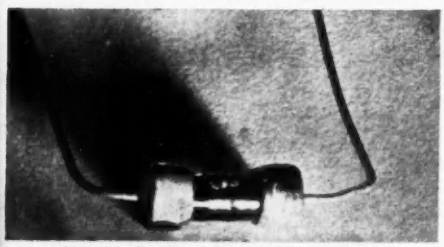
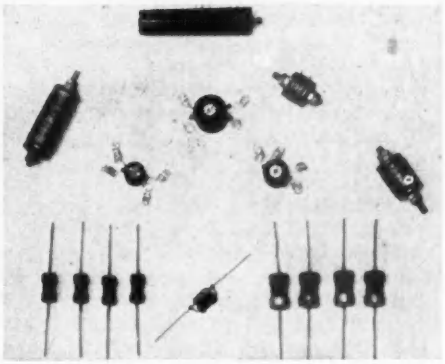


Fig. 2. Small copper-oxide rectifier (about 1½ times actual size)

It is necessary to apply pressure to the element surface to obtain a low contact resistance, and a compression spring is included in the assembly of the elements, discs being fitted into a tube of insulating material, while washers are assembled on a spindle over which an insulating sleeve has first been placed. Protection from moisture is obtained, where necessary, by dipping the assembly in paint or by incorporating a hermetic seal in the design of the housing.

Copper-oxide rectifiers are most suited for use in voice-frequency and higher-frequency circuits where their smaller self-capacitance is advantageous.

They are also used with moving-coil measuring instruments where their lower voltage drop introduces a minimum of distortion from a linear scale shape.



Figs. 3 and 4. A selection of small copper-oxide rectifiers as used in Post Office work

The metal rectifiers shown in Figs. 2, 3 and 4 give some idea of the types of copper-oxide units now in use, indicating the variety of applications where the reliability of the metal rectifier commends itself in essential communication networks.

"Westalite" Units

The element of a Westalite rectifier consists of a layer of a selenium compound formed on a steel plate which acts as a support; on the selenium is sprayed a thin layer of a special alloy containing tin and cadmium. Current will be found to flow readily from the selenium to the alloy film, but is restricted in the opposite direction.

The elements range in size from discs of about ¼ in. diameter to rectangular elements 12 in. × 3 in. with several intermediate sizes which are either circular washers or rectangular plates.

Pressure is required to minimise the contact resistance and a similar form of construction is employed for both copper-oxide and the smaller Westalite elements. The larger elements are mounted on one or more spindles over which an insulating sleeve has been placed. Cooling fins are added to these power rectifiers to enable their output to be increased. The assembly is then dipped in a heavily loaded paint for protection, or the units may be immersed in transformer oil. A typical group of units is shown in Fig. 5.

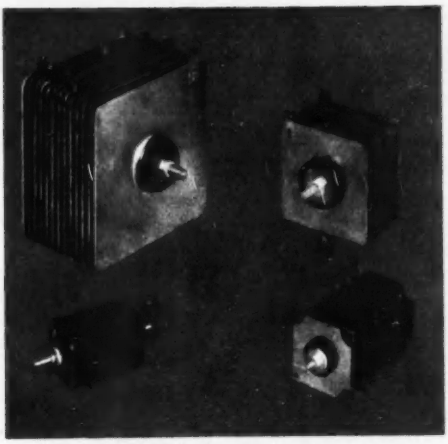


Fig. 5. Typical "Westalite" selenium units

This was the first type manufactured, and in view of more recent developments, which will be described, is now commonly known as the "single-voltage" Westalite rectifier, and is manufactured in sizes from $\frac{5}{8}$in. dia. to 12 in. $\times$ 3 in.

The elements of the double-voltage units are identical in appearance to those of the ordinary Westalite rectifier, but the composition of the selenium compound, the spray for the counter-electrode, and the manufacturing process, are different. The assembly is also the same and the unit is dipped in a heavily loaded paint for protection, or the unit may be immersed in oil. A dab of green paint is placed on all double-voltage units to assist in identification.

Quadruple-Voltage Units

The demand for a high-voltage, low-current rectifier for cathode-ray tubes has increased enormously in recent years. The 36 EHT range of quadruple-voltage Westalite rectifiers has been developed for this purpose; the reverse resistance has been increased so that fewer elements are required, and rectifiers for a peak voltage of 2,000 volts per inch length of unit have been in service for some time. Fig. 6 shows a number of quadruple-voltage circuits.

For outputs which are less than about 20 volts, single-voltage Westalite is normally used. For medium power outputs the choice between double- and single-voltage largely depends on the actual value of d.c. current and voltage required. For heavy power requirements the double-voltage rectifier is by far the best, while for high-voltage work the double-or quadruple-voltage rectifier is used, depending on the d.c. current required.

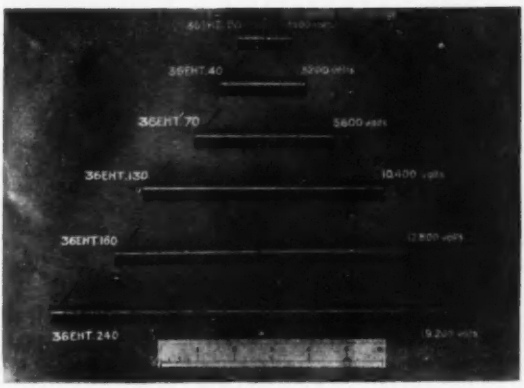


Fig. 6. Group of quadruple-voltage rectifier units showing small dimensions

Performance

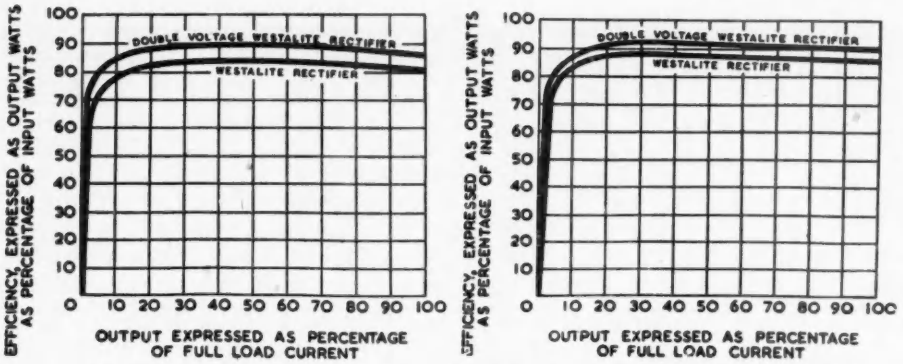
The experience gained during the past 25 years substantiates that the copper-oxide and Westalite rectifiers have a very long life; several of the copper-oxide equipments installed in 1928 and 1929 are known to be still in service without any repairs having been carried out on them. While the experience available with selenium rectifiers is limited to about 10 years, the indications are that they will last at least as long when correctly installed.

The initial settling-down period, in which the forward resistance of the rectifier slightly increases, is common both to the copper-oxide and the various types of Westalite rectifiers, but the change in resistance is so small that it may be ignored in the latter case.

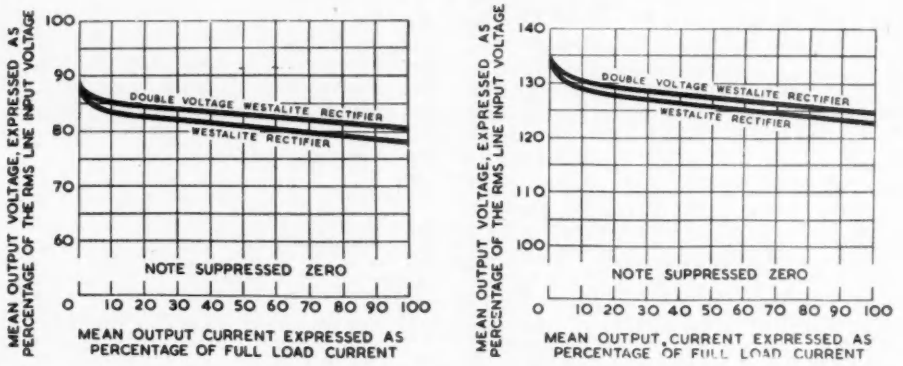
Efficiency

Both copper-oxide and Westalite rectifiers have not only a high efficiency at full load, but what is also important, the efficiency remains high as the load is decreased. This is most important in the case of plants with large d.c. outputs, which may not always be loaded to capacity.

Fig. 7 illustrates the efficiency of a Westalite and a double-voltage Westalite rectifier operating on a single-phase system and feeding a magnet load. The shape of the efficiency curve should be studied, the efficiency reaches 90% and remains about 80% even down to 8% full load in the case of the double-voltage type.


EFFICIENCY, EXPRESSED AS OUTPUT WATTS AS PERCENTAGE OF INPUT WATTS
DOUBLE VOLTAGE WESTALITE RECTIFIER
WESTALITE RECTIFIER
OUTPUT EXPRESSED AS PERCENTAGE OF FULL LOAD CURRENT
EFFICIENCY, EXPRESSED AS OUTPUT WATTS AS PERCENTAGE OF INPUT WATTS
DOUBLE VOLTAGE WESTALITE RECTIFIER
WESTALITE RECTIFIER
OUTPUT EXPRESSED AS PERCENTAGE OF FULL LOAD CURRENT

Figs. 7 and 8. Comparative efficiencies of single and double voltage rectifiers when used in single-phase (left) and 3-phase (right) circuits


MEAN OUTPUT VOLTAGE, EXPRESSED AS PERCENTAGE OF THE RMS LINE INPUT VOLTAGE
DOUBLE VOLTAGE WESTALITE RECTIFIER
WESTALITE RECTIFIER
NOTE SUPPRESSED ZERO
MEAN OUTPUT CURRENT EXPRESSED AS PERCENTAGE OF FULL LOAD CURRENT
MEAN OUTPUT VOLTAGE, EXPRESSED AS PERCENTAGE OF THE RMS LINE INPUT VOLTAGE
DOUBLE VOLTAGE WESTALITE RECTIFIER
WESTALITE RECTIFIER
NOTE SUPPRESSED ZERO
MEAN OUTPUT, CURRENT EXPRESSED AS PERCENTAGE OF FULL LOAD CURRENT

Figs. 9 and 10. Comparative voltage regulation curves of single and double voltage units when used in single-phase (left) and 3-phase (right) circuits

Fig. 8 illustrates the same performance curves for a three-phase rectifier. It will be noted that the efficiency is slightly higher, nearly 92%. This excellent performance may be obtained with an output as low as 6 volts d.c.

Voltage Regulation

The voltage regulation of the Westalite rectifier is an improvement on that of the copper-oxide rectifier while that of the double-voltage Westalite is even better. Fig. 9 illustrates typical voltage regulation curves for Westalite and double-voltage Westalite rectifiers, used in a single-phase bridge circuit, the load being resistive or inductive. It will be noted that the voltage drops appreciably from zero to about 15% full load, after which the curve becomes linear with a gentle slope. Fig. 10 illustrates similar figures for a three-phase bridge circuit.

Westalite and double-voltage Westalite rectifiers are usually designed to operate so that the temperature of the elements does not exceed 70° C (158° F). The current rating is determined by the available difference in temperature between the rectifier elements and the surrounding air or other cooling medium. The maximum ambient temperature at which a Westalite rectifier may usefully be operated continuously is about 55° C (131° F), although operation at a slightly higher temperature for a short time may not produce very serious deterioration. Element temperature can be measured only by embedding a thermo-couple in the rectifier unit during assembly; tests taken with a thermometer may show a temperature about 5° C (9° F), lower than the true element temperature, even when precautions are taken to obtain good contact.

Copper-oxide rectifiers are employed as a rule in circuits where there is little self-heating and may be used under all of the above conditions without reduction of rating except in special cases.

Further articles will deal with circuitry and applications of metal rectifiers.

Our readers' views ...

Voltage Reduction

FROM his letter in your April 5 issue, Mr. F. C. Platt gives the impression that all Master Clock controlled time systems are affected by mains voltage reduction. This, of course, is far from being the case.

The type of system he describes as operating on rectified a.c. is presumably the American type, for British manufacturers have consistently recommended trickle-charged accumulators as the source of current for their systems.

Under present day conditions the wisdom of that policy is readily apparent and British controlled time systems are thus unaffected by the maddening fluctuations in frequency voltage or even by complete power cuts.

E. Downs
GENT & CO. LTD.

LEICESTER

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Small Switches

REFERRING to "Notes on Wiring" by "Megohm" and his feature article "Fifty Years Ago," which appeared in the April 19 issue of the ELECTRICAL TIMES, we are surprised that no mention was made of A. P. Lundberg and Sons Ltd., in view of the fact that W. Perren Maycock's book appears to have prompted the article.

Mr. Perren Maycock's later book "Small switches etc., and their circuits", dated 1911, deals solely with Lundberg products and the following is quoted from the Preface :

"This book deals with the deservedly well-known manufactures of Messrs. A. P. Lundberg and Sons; and with the methods of connecting them in the electrical circuit.

"If any excuse be needed for writing a work dealing exclusively with one firm's goods, it may be said that Messrs. Lundberg have undeniably had more to do with the development and improvement of tumbler switches and kindred accessories than any other firm in existence; many of their inventions having had the sincerest form of flattery—imitation—bestowed upon them by other makers.

"Mr. Andreas Peter Lundberg, M.I.E.E., the founder of the firm, who was born in Sweden in 1831, and educated there, first visited England in 1856, but did not settle here permanently until 1862. After a few years work on his own account, he joined Messrs. Crompton and Co. This was in 1878, and Mr. Lundberg was, in fact, the first man to be employed at the works at Chelmsford. One item of work there was the assisting in the making of the first successful Crompton Arc Lamp, which subsequently gained a Gold Medal at the French International Exhibition of 1880-81. He left Crompton's at the end of 1881 to start the present business.

"There seems to be little doubt that Mr. Lundberg visualised the use of electricity far ahead of his time.

"If anybody ever writes a history of the evolution of electrical accessories, and gives the name of the *real* designer and manufacturer in every case, it is safe to say that the name of Lundberg will have to be mentioned on almost every page."

A. P. Lundberg and Sons Ltd., is now an associate company of Simplex Electric Co. Ltd., and the products are manufactured in their factory at Oldbury.

D. N. Dale
ADVERTISING MANAGER
SIMPLEX ELECTRIC CO. LTD.

OLDBURY

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Metal-Carbon Contacts

WE were interested to read in your issue of March 15, the article from your correspondent F.R.S. under the heading "Mainly Mechanical." In this article F.R.S. states that the combination of a copper contact working on a copper segment is unavoidable in drum controllers, and observes that this is an unsatisfactory arrangement.

Whilst agreeing generally with your contributor that this is true so far as the more highly rated controller applications are concerned, we feel that details of a new development of metal carbon materials suitable for contacts in drum controllers, which are rapidly gaining favour among users of such equipment, may be of interest to your readers.

The essential features of these new materials is the incorporation of metals in a refractory carbon base in such a way that the properties of carbon, which make it such a valuable contact material, namely its non-welding characteristic, its self lubrication, and its resistance to burning, have been retained, whilst providing in addition a good shock resistance and electrical conductivity, adequate for most contact applications.

Metal carbon has, however, a slightly higher contact resistance than pure copper. The electrical losses are therefore somewhat higher, but for the majority of contact applications this slightly greater heating can usually be accommodated without detrimental effects to the equipment. This extra loss is a small price to pay when the benefits of increased contact and segment life, and reduced maintenance are taken into account.

We trust the contents of this letter will prove of general interest to your readers.

F. J. Perry
(Manager. Carbon Products, Technical Dept.)
THE MORGAN CRUCIBLE CO., LTD.

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"Troubles and Remedies"

ON page 825 of your issue May 17 the steps to be taken when the field winding of an exciter is reversed are stated to be "reverse connections, run the machine above its rated speed, and if necessary short-circuit the armature to cause the excitation to build up." I, and perhaps other readers also, would be interested to know (*a*) why the exciter should be run above its rated speed, and how this can be achieved; (*b*) how the short-circuiting of the armature would cause the excitation to built up.

R.A.

BOLTON

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REFERRING to R. A.'s queries, I would point out firstly that the Table is concerned with *all* types of generators, including machines having separately driven exciters, and the suggested remedies will be considered only where applicable. In this connection, the maintenance engineer investigating operational trouble will know if and how the exciter can be run above its rated speed.

Regarding the why and wherefore of the suggested remedies, I must point out that it is beyond the scope of the table to provide any detailed theoretical discourse on the recommended remedial measures which are essentially the outcome of considerable experience in *practice*. The particular method in question for building up the excitation will often overcome the need to bring the machine to rest for the purpose of "flashing the field." I therefore commend it for trial where it appears to be suitable for a particular case.

S. Spence
B.Sc.

TIMPERLEY, CHESHIRE

I WOULD refer to the article in your issue of May 17, entitled "Troubles and Remedies," with a sub-heading to the effect that it is a "series of trouble-shooting tables specially compiled to assist Maintenance Engineers in rapid fault diagnosis."

The article in itself is excellent for inexperienced people, but surely it is somewhat out of place to offer such elementary advice to Maintenance Engineers. Judging by his remarks, Mr. Spence appears to have a very low opinion of their capabilities and intelligence. In fact, I think he owes them an apology. It would be interesting to know if my opinion is shared by other engineers.

HAYWARDS HEATH *G. S. Marchant*

[Judging by the number of requests we have received for back numbers, for reprints, for permission to reprint privately (and, for that matter, the number of private reprints made without permission) there hardly seems to be universal agreement with our correspondent.—ED.]

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"Appeal to Manufacturers"

I FULLY appreciate Mr. Rayment's desire to have the purchase tax embodied in the ultimate price to the consumer but I think it is a great mistake to hide from the members of the public the heavy imposition the industry suffers through this iniquitous tax. The public are not always alive to the fact that the cost of the article without tax is probably 50% less than the price asked.

As a compromise I would suggest that where the selling price and tax are merged a note should appear stating the amount of tax that is included.

A. B. Wildsmith
(Director, Electrical Wholesalers' Federation)
LONDON, W.C.2.

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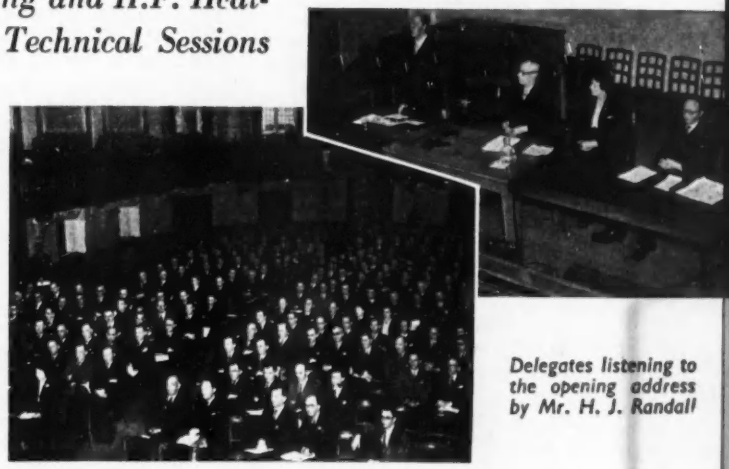
I STRONGLY disagree with Mr. Rayment's suggestion that prices should be quoted inclusive of purchase tax. The actual cost and the amount of P.T. should be given equal prominence in all publicity, price tickets, etc., so that the public can see where its money goes.

T. J. Barfield

ROBERTSBRIDGE,
SUSSEX.

E.D.A. Sales Management Conference

Mechanical Handling and H.F. Heating Wind Up the Technical Sessions



Delegates listening to the opening address by Mr. H. J. Randall

LAST Thursday saw the continuation of the E.D.A. Sales Management Conference, the opening address and earlier papers being reported in our last issue.

The opening session was devoted to a paper by Mr. L. LANDON GOODMAN, B.SC., A.M.I.E.E., A.M.I.MECH.E., of E.D.A., on the subject of More Mechanical Handling as an Aid to Greater Productivity.

Emphasising that materials handling was not an exact science, Mr. Goodman pointed out that there is no process in industry which would better repay study. In many factories 50 tons of materials are moved for every ton of finished product produced, and that materials handling might quite easily account for between 15% and 85% of the production costs of an article.

Plant Layout

The ideal factory would be specially designed for a given product, and would, therefore, have a minimum of materials handling equipment. In Great Britain one normally had to apply existing buildings to produce far more than was originally intended that they should. While the first necessity was always to analyse the plant layout with a view to eliminating as much handling as possible, the next step must be to mechanise as far as possible. In doing so, sight must not be lost of the many not so obvious situations where a simple sling, turnover fixture or chain block could shorten many operations.

After reviewing the problem from a national standpoint, the author suggested a number of ways in which the supply industry could help. These included the appointment of materials handling engineers to Area Board staff for advisory work—either to the industrial power engineer or direct to the consumer; by having a list of local handling engineers competent and willing to give such advice; by the appointment of materials handling engineers to E.D.A. staff so that they could assist any Area Board requiring advice, and could arrange training for Area Board personnel to enable them to advise on the simpler type of scheme.

H.F. Heating

The paper on "Radio-Frequency Heating," given by Mr. R. SMITH, B.SC., A.INST.P., of the General Electric Research Laboratories, gave, in concise form, the basic information necessary for the intelligent application of this type of heating to industry.

Commencing with a general statement of the principles involved, the author reviewed the three methods of generating r.f. power. Spark-gap oscillators, not now used as widely as other methods, have been used for output powers up to about 35 kW at frequencies from 12-200 kc/s, the efficiencies being about 50%. High-frequency alternators still constitute the largest connected load for induction heating, their chief use being in the melting of metals, and in the five years preceding the war the output in use in the Sheffield area alone increased from about 6 MW to 16 MW. The range covered is from about 500 c/s to about 15 kc/s, outputs varying from 50 kW upwards. Efficiencies of 60-75% were obtained, and it was pointed out that the frequency range was much too low for dielectric heating.

Snapped at the Conference—Miss K. Wilson (B.E.A.), Mrs. N. V. Nixon (H.Q. Welfare Officer, B.E.A. Catering Services) and Mlle Cossus (A.P.E.L., France)

Valve oscillators were first used for heating purposes as long ago as 1925, but have been very considerably developed in the last ten years, units now being built up to 200 kW. Frequencies vary from a few hundred kc/s to a few Mc/s for induction heating, dielectric heating being carried out in the range 2-100 Mc/s, with a generator efficiency in the neighbourhood of 50-60%. An important characteristic of the valve oscillator is its low "stand-by" loss, the power taken from the mains depending on that actually being delivered to the work. Three-phase supply is customary above about 1 kW, the p.f. being of the order 0·85-0·95.

On the economics of r.f. heating the author said that it was not possible to give more than a general indication of the costs, but the capital cost of valve generators could roughly be assessed as from £200-£350 per kW between 1 and 4 kW and £100-£200 per kW for sizes 5-30 kW. In estimating running costs, max. demand should be assumed as double the maximum output. Valve life could be taken as 2,000/5,000 hours, and a useful approximation in estimating replacement costs was to add 1d. per kWh to the power cost. In considering any new industrial use, it was advisable to investigate the economic aspects first, before technical problems were considered.

CAPE TOWN'S PROBLEMS

CONDITIONS besetting the electricity supply authorities in Cape Town have a peculiarity of there own for the area of supply, some 229 miles in extent, embraces a mountainous region. As the city electrical engineer, Mr. H. A. Eastman, B.SC., M.I.E.E., points out in his report for the year ended December 31, 1949, just to hand, most of the habitable part of the area not yet developed electrically is at present sparsely populated and contains many isolated housing schemes. Bearing in mind that these will eventually expand and merge into adjoining housing schemes, it has been neccesary to introduce special methods for extending the mains to them economically so that ultimately the system may become standardised with the minimum of additional expenditure.

Like many other cities in the Union, Cape Town experienced steady expansion in 1949. The number of consumers connected increased by 3,042 bringing the total to 69,264 and units sold in that year also rose by 6·9% to over 476 millions, providing a revenue of £1,716,110 (an average of 0·8645d per unit—the lowest figure so far recorded). Of this sum, consumers in the municipal area on the domestic rate contributed £771,659, at an average price of 0·7001d. per unit, while those on the lighting rate provided £257,338, an average of 3·0457d. per unit. Nearly 13 million units were used by the tramway undertaking, and over nine million units for the city's street lighting.

Sales of domestic appliances under the Council's hire purchase scheme decreased during the twelve months ended July 1950, due, no doubt, to the restriction on imports, but over 1,000 more electric cookers were installed. The chief reduction was in respect of refrigerators, of which only 216 were sold on h.p. compared with 1,173 in 1948.

Table Bay power station, with its fourth 40MW generator and seventh 230 klb/hr boiler installed, generated over 621 million units during the year under review, with a thermal efficiency of 24·1%, and coal consumption of 1·184 lb/unit sent out. Salt River too supplied nearly 231 million units, but it was necessary at times to call upon the old Dock Road station, which generated a further 16·4 million units. We have already reported that work has started on the construction of Salt River No. 2 station, for which contracts have already been accepted.

The year's working resulted in a gross profit of £198,226, of which £133,575 is transferred to the interest and sinking fund, £5,000 to a betterment fund, and £54,651 to the relief of rates. With only £5,000 set aside for depreciation or obsolescence of distribution equipment, it might well be asked if the Council is pursuing the best policy in using the major part of the surpluses of the Electricity Department to keep the general rates low.

Notes on Wiring
by MEGOHM

HOUSE OF LORDS

Lighting Fittings Retained in Chamber

LOOKING over the new installation work being carried out at the House of Lords, it is interesting to note that the lighting here is on traditional lines, using tungsten lamps throughout, which is in direct contrast to the lighting scheme recently completed for the new House of Commons. The general lighting for the chamber is from the old and beautiful chandeliers which have been renovated and now fitted with concealed flood-lighting units to illuminate the magnificent ceiling of the chamber, and each chandelier is also wired for emergency lighting.

Lighting and Atmosphere

The frescoes at each end of the chamber and the throne are illuminated by concealed reflectors fitted with tungsten strip lamps and the general lighting effect and atmosphere, I think, is extremely pleasing. In my opinion, it is very important that the right atmosphere as well as the intensity of light should be achieved in any lighting scheme, since so many lighting schemes have, unfortunately, been spoilt by lack of colour, contrast and interest.

The original counterweight system for raising and lowering the chandeliers, which was installed in the roof void over the chamber, has also been retained and spring-wound cable drums fitted, which now enables these large chandeliers to be raised and lowered without the necessity of introducing plug and socket connections.

Each cable drum carries a 7-core t.r.s. circular flexible cable; two cores of the cables being utilised to serve the lamps for the general lighting, two cores for floodlighting, two cores for secondary lighting, and the last core for the earth continuity conductor.

All circuit wiring for the chamber has been carried back to a main switch and motor-driven dimmer board, positioned in a small room on the chamber floor level, to the right of the entrance to the chamber. This cubicle switchboard is fitted with circuit fuses, local switches and push buttons for centralised control of the installation, which I consider is a very sensible arrangement and far preferable to positioning switches in various locations in or around the chamber.

The circuit wiring for the installation has been carried out using 660 V v.r.i. cables enclosed in galvanised heavy gauge screwed welded conduits, with the exception of the circuits serving the frescoes, where the wiring used was mineral insulated copper sheathed cables, neatly run on the surface and concealed in the decorative features of the panelling.

The wiring installation for the sound amplification system comprises flat twin p.v.c. cables for the loudspeaker circuits and twin twisted p.v.c. cables for the microphone circuits; these cables being enclosed in separate galvanised heavy gauge screwed welded conduits and also in galvanised fabricated sheet steel ducts. The galvanised steel ducts have been run beneath the chamber floor level on three sides, forming a U-shaped distribution duct from which galvanised conduits are run to the various loudspeaker units and microphone sockets.

Ventilation

Small loudspeakers are positioned in the galleries and on the Members' and Press benches. Microphone sockets are let into the cast iron grille plates covering the floor of the chamber and are also installed in the roof void for connecting to microphones suspended from the ceiling of the chamber.

The old cast iron grille plates over the whole of the chamber floor are an interesting features in this modern age. The main heating pipes run below these plates and assist the ventilation in maintaining regular air changes. Up to now it has not been found necessary to install any motor-driven fans to assist or accelerate the air changes in the chamber, although I understand it is now under consideration to install ventilating plant in the near future.

Wiring services have also been installed for impulse clocks and temperature control, and here again the wiring comprises v.r.i. cables enclosed in galvanised heavy gauge screwed welded conduits.

Another Area Board Tariff

THE third Area Board to report some measure of progress towards standardisation of its tariffs is the South Eastern Electricity Board. But, although many changes are evident in the list, no clean sweep has yet taken place as with the North Eastern and Midlands tariffs, details of which were given last week. The South Eastern Board's alterations include the standardisation of the minimum running charge at 0·875d. per unit under domestic and commercial two-part tariffs, (but *not* the fixed charge), and the introduction of certain uniform flat rates. Thus, for cooking, space heating and small power, the minimum flat rate is 1½d. p.u.; while for water heating, soil heating, battery charging and restricted hour power supplies the minimum flat rate is 1d. p.u.

Another standardisation differing from the other Boards is the substitution of a uniform rental of 5s. per quarter for two-part tariff prepayment meters in place of the varying charges at present. But meter rents on credit two-part tariff supplies are to be abolished, together with the withdrawal of cash discounts in the few places where these are now offered.

To make way for these changes, a large number of minor and complicated tariffs have been withdrawn. Like the new tariffs, these modifications will operate from the first normal meter reading after June 30.

Several new tariffs have been introduced to apply in certain districts. Thus in the Ashford, Canterbury, Faversham, Gillingham, Lewes, Maidstone and Shoreham districts, there is a variable block tariff where the assessed demand does not exceed 50 kVA. Under this there is a charge of ⅚d. p.u. per 500 units per year per kVA of lighting installed, plus 100 a year per kVA of heating installed, and 100 a year per h.p. of motors installed, with all additional units at 1d. In these districts there will also be a three-part tariff providing for a service charge of £1 p.a. per kVA of assessed demand, plus £5 10s. per kW of actual m.d., and a current charge of 0·7d. p.u. Another new tariff, for Purley, Sevenoaks and West Kent districts, is for small power, for which the charge is to be 3d. p.u. for the first 100 units p.q., per h.p.; all in excess being at 1d. p.u. Minor amendments to other tariffs also apply in certain additional districts.

In circulating these details, the Board states that about 50,000 consumers, at present on the more expensive tariffs, will pay less than at present, but half a million will pay more, while almost as many will continue at about the existing rates.

RENOVATIONS IN THE LORDS

WHEN the Commons took over their rebuilt chamber in the Palace of Westminster last year, it was decided that an extensive cleaning and renovating operation should be carried out in the House of Lords Chamber before their lordships reoccupied it. Advantage was taken of this opportunity, to re-equip the chamber electrically, and many detailed improvements were apparent when we viewed the nearly-completed arrangements last week.

Tungsten lamps have been retained for lighting purposes, increased intensity being obtained by providing more higher-powered lamps. The main fittings are ten corona pendants designed originally for gas lighting, and each of these carries six prismatic glass reflectors, each with one 150 W lamp. New provision has been made for upward illumination to show ceiling detail—three 200 W lamps with a brass reflector are provided in each pendant, arranged so as to be not visible from below.

Wiring

Because of the greater load occasioned by the modified lighting scheme, most of the wiring installation has been renewed, 660 V grade v.r.i. run in galvanised steel conduit is mostly used, with resort to mineral insulated copper sheathed cable in constricted positions. Additional circuits have been run to provide battery-operated emergency lighting in the chamber, principle rooms, and exit corridors.

For lighting control purposes, a comprehensive board is installed just outside the chamber at the bar end. The illumination intensity in the chamber can be varied by push button control, a 12 kW bank of dimmers being operated by an electric motor. A second, 9 kW, bank of dimmers allows control of the lights illuminating the ceiling and the frescoes. Light meters are incorporated in the dimming panels, indicating the intensity at various points in the chamber. The lighting control room has also been made the central point for a system of distant reading thermometers.

A sound reinforcement system somewhat similar to that in the Commons has been installed with 14 unidirectional microphones suspended from the ceiling and an additional bi-directional unit on the table of the House. Control engineers select the one microphone that is normally operative at any given time, 320 miniature voice reproducer units operated at a low-level of sound intensity, and provided on a general scale, except in the Press gallery, of one to two seats. ensure the audibility of speeches in all parts of the Chamber.

Troughton and Young Ltd., were the main electrical contractors, Enfield cables were run in conduits and fittings supplied by Walsall Conduits Ltd., while Pyrotenax Ltd. supplied the m.i.c.c. cable used. Chloride Electrical Storage Co. Ltd. were responsible for the stand-by batteries and Sound Rentals (Tannoy Products) Ltd. for the sound amplification system.

Problems and Practice

IN ENGINEERING

Mixed Fuse Carriers

A NATIONALLY known firm of building contractors is in the habit of using a machine in their woodworking shop on housing sites. This machine is primarily a motor driven circular saw and is arranged to cut across a long bench, being pulled across by the operator. The head on which the saw is mounted, in addition to being raised or lowered, can be swung round the vertical pillar, also it can be swivelled from the vertical, so cutting at all angles. By the substitution of cutters for the saw, notching can be carried out on such materials as roof timbers.

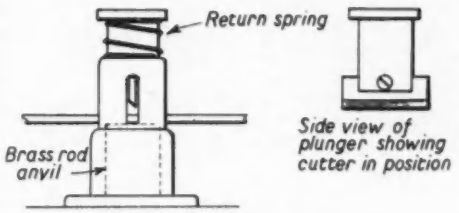
One day the operator of one of these machines, drew the attention of a wireman employed on the site, to the fact that his machine, driven by a 4 h.p. 3 phase motor, would not take a normal load, the man after a glance over the motor and starter, called me to help solve the mystery.

I.R. and circuit test did not reveal the fault, but on opening the cover of the triple pole isolating switch fuse, I noticed that one H.O. fuse carrier was of a different pattern from the other two, inspection showed that the contacts of this carrier were entirely different, and that efficient contact could not be maintained, and this had led to running on 2 phases. Here probably is a case where three no volt releases would have been of advantage. I cannot imagine an electrician expecting to get satisfactory service from an installation left under such conditions.—*G. B.*

Bench Wire Cutter

WHEN carrying out bench repair work involving the re-building of large starters, etc., the fixed wire cutter, as sketched, will be found very useful. This cutter bridges the gap between wire that can be cut by ordinary pliers, and rod, or strip, requiring the attention of the hacksaw. The base consists of a 1¼ in. steam pipe flange into which is screwed a short length of steam pipe. The plunger is turned from mild steel, and slotted as sketched to take a cutter blade made from a piece of ¾ in. by ⅛ in. spring steel. This blade is drilled ⅛ in., and retained in position by a 2 B.A. countersunk screw. After grinding the cutting edge, the cutter is hardened, and tempered dark blue.

A light spiral spring is used to raise the plunger and cutter blade, and to locate them, the guide barrel is slotted to clear the cutter. The slot ceases about ¼ in. from the top of the barrel, and so, when the cutter blade is in position, retains the plunger against the action



of the spring. To enable the spring, plunger, and cutter to be assembled, a hole to clear the 2 B.A. csk. screw is drilled through the side of the barrel at right-angles to the slot. Assembly consists of slipping the spring over the plunger, placing the plunger in position in the barrel, sliding the cutter blade through the slot, and retaining it by screwing home the screw. The cutter anvil consists of a suitable piece of brass rod driven into the barrel from underneath as shown. A ¼ in. hole is drilled through the barrel at right-angles to the slot, and elongated by filing. This hole admits the wire for cutting. —*R. S.*

Pump Bearing Trouble

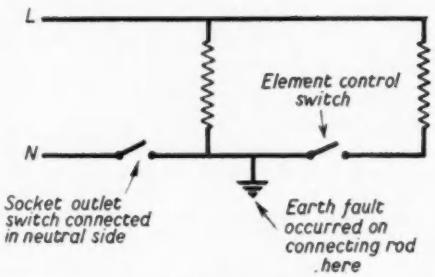
ON taking over charge of a large railway installation in India, I went on a round of inspection calling first at the pumping installation which consisted of two sets of 10,000 g.p.h. centrifugal pumps driven by 8·5 h.p. 3 ph 400 V s.c. motors. The attendant gave me to understand that the outboard bearing of one of the pumps was constantly overheating since it was changed recently, which necessitated shutting down frequently to allow the bearing to cool. At first it was suspected that the bearing was receiving an overdose of grease, particularly as screwdown type grease cups were fitted and the housing being found full on inspection. The housing was removed and the bearing cleaned and lubricated. No defect being apparent. After replacement, the set was tried and the same overheating symptoms persisted. I then had the pump opened and

also got the attendant to produce the bearing which had been removed. After inspecting the bearings on the impeller shaft the cause of the trouble became apparent. In this particular type of pump, both outboard and inboard bearings were double row ball self aligning and the replacement used was of the correct size but unfortunately rigid. A new bearing of the correct type was fitted and was found a good antidote for overheating.—*W. H. Gatehouse.*

Danger from Neutral

AN interesting fault was recently brought to my attention by a very agitated neighbour, who had switched off her electric fire at the three-pin 15-amp switched socket outlet to which it was connected, only to find that one of the two elements remained aglow. The other element had been previously switched off by means of the controlling switch on the side of the fire. Upon investigation I found that one of the solid brass connecting rods between the terminal block and the switch controlling the second element had "shorted" on to the casing of the fire.

I immediately suspected that the socket outlet had been wrongly connected, with the neutral switched instead of the live, and upon testing the polarity of the circuit found this to be so. Consequently the live supply was available at one of the element terminals irrespective of the position of the switch on the socket outlet, and a return path was provided from the other terminal via the casing of the fire and



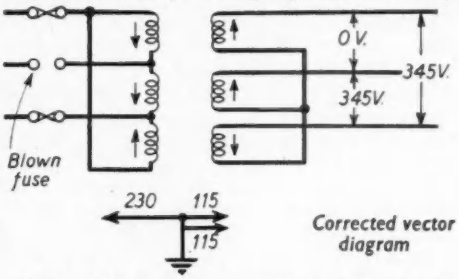
Control circuit for electric fire

earth lead to earth. The second element could, of course, be switched off independently, as the earth fault occurred on the isolated side of the element switch. This incident serves to illustrate the importance of adhering to the I.E.E. Regulations, which state that all switches must be fitted in the live feed.—*L. F. Smith.*

A Vector Correction

IN your edition of the ELECTRICAL TIMES of May 3, you publish under "Problems and Practice" (p. 744) a letter from Mr. B. H. Williams on "Fuse Unbalances Supply." Superficially, it appears from an enclosed diagram that Mr. Williams has "discovered" a new and satisfactory method of conversion from a single phase to a three-phase supply.

This is not so, however. When the h.v. h.r.c. fuse in one phase supplying the transformer's primaries had blown, the supply became virtually a single phase, and only



single phase output could be obtained, the line voltages being 345, 345 and 0, while the line to earth voltages were 230, 115 and 115. The vector diagram with primary fuse blown should be as shown. Renewing the h.t. fuse *would* "put things normal again."—*A. H. Lumsden-Carroll.*

(We have to thank other readers who have pointed out this error.)

A Testing Instrument

A USEFUL testing instrument can easily be constructed in the workshop, from spare parts, and at little cost, using an old-type telephone ear-piece and a length of brass rod. Remove internal parts up to the diaphragm which may be used, although much better results are achieved if this is replaced by a disc of phosphor bronze. Solder a length of brass rod on to the centre of the diaphragm, using a sponge rubber bush at outlet. This instrument will help the electrical engineer to locate faults by sound, and is particularly useful in locating worn motor bearings, or any wearing moving parts in electrical machinery, vacuum cleaners, washing machines, refrigerators, etc. It may also serve a useful purpose for the radio engineer in testing sets and loud speakers.—*B. Quarmby.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

New Techniques for SCOTTISH HYDRO POWER

Sir Edward MacColl speaks at I.E.E.

INTEREST in Great Britain's principal water-power projects attracted a large audience of engineers to Savoy Place last week to hear SIR EDWARD MACCOLL (Dep. Chairman, N. of S. H.E. Board) deliver the I.E.E. Supply Section annual lecture. Sir Edward entitled his address, "Hydro-Electric Power Development in Scotland," and began, appropriately, with a review of the progress of such work up to 1943 when the H.E. Board was formed.

Amongst the clauses of the 1943 Act is one that effectively requires the H.E. Board to sell to the B.E.A. a declared quantity of energy (surplus to North of Scotland requirements), with a declared peak kW value, at a price equivalent to that entailed if coal of a certain price and calorific value were used to generate the energy in the most efficient B.E.A. station. The coal price and quality is determined by reference to costs in the Scottish generating divisions of the B.E.A. This requirement sets a standard of economics for H.E. Board planning purposes.

Potential Power

Estimates of the economically developable water-power potential of the North of Scotland have increased from 1,880 m. units/year (1921) and 6,274 m. units/year (1944) to 12,000 m. units/year. Increased cost of coal and plant which brings more expensive schemes into the economic range accounts for some of this rise, and changed engineering ideas for the rest.

Tunnelling to join catchment areas has been undertaken more and more, and consideration is given to pumping water over watersheds—the cost of raising water 100 ft is likely to be worth while if an effective head of 1,000 ft can be obtained as a result.

Possibilities of tidal power—particularly in sea lochs—are considerable, but they have not been examined in detail, as they are likely to be less economical than straight hydro-electric schemes, and they have no firm kW value. Wind power is on the whole more promising, especially for application on isolated sites in connection with oil stations, where the delivered cost of the oil is high. The Orkney scheme is likely to come into operation next month: in this case a diesel station will supply the magnetising current for the windmill-driven induction generator.

Scotland provides some remarkable examples of the diversity of rainfall between localities near to one another. Moreover, since rain statistics are mainly based on gauge readings at comparatively low levels, estimates are probably conservative. About 44% of the total annual rainfall is found to occur in the four months October to January, and the effective yield of water is still more concentrated, for evaporation has a greater effect over the rest of the year.

Rainfall and Reservoirs

Rainfall characteristics of this type, together with the risk of having the whole run-off suddenly fixed by a severe frost, make the impounding of water a necessity. The best economical solution is found to be a combination of thermal station and reservoirs. On the whole, Highland rivers tend to be flashy, with a maximum flow of 15 to 20 times the average. Some idea of conditions may be had from Loch Sloy catchment area figures, with 13 days with 2 in. of rain and more, 60 days with 1 in. and more, and 230 days with 0·5 in. and more, but it should be noted that surface soil characteristics have a big effect—quick run-off from rock, while peat, etc., may hold the water for a month.

Storage is mainly a matter of cost. The H.E. Board supplies storage sufficient for 20·5% of its annual output, and ground storage of the type just discussed adds one-third of this again. Hydraulic heads used range from 16 ft. to 1,365 ft, though most heads lie in the range 250 ft to 900 ft. Individual stations are not large, but some group schemes with several stations attain considerable plant totals.

Pumping

Reversible hydraulic stations are a useful means of using spare capacity, and 73% efficiency for the pumping operation seems attainable. The number of suitable sites is limited, and no station has been directly designed for this purpose. However, in connection with the Lawers scheme (30 MW pelton wheel station,

1,350 ft head) a 12 MW pump is being installed. In general, the southern part of the H.E. Board area may have pumps, and be supplied during off-peak hours with electrical energy from the north, where larger reservoirs are possible because of the more favourable geological conditions. Such an arrangement may effect a saving by reducing the long-distance transmitting capacity which would otherwise have to be provided to meet the peak load demands in the south of the area.

Station Design

Early stations had three or four generators, though this was later reduced to two. The present practice is to think in terms of one set per station, though this may sometimes lead to difficulties where it is required (for fish conservation) that a minimum quantity of water shall be let down all the time. Another change has been an increasing preference for horizontal shaft turbine as against the vertical. Two main factors are involved—better building dimensions are possible with the horizontal design, and there is less need for skilled civil engineering labour. Further to this, Kaplan turbines are tending to replace vertical Francis types on low head schemes.

Where dams are concerned, gravity or buttress designs have been used in the past, but consideration is now being given to the rock fill type. Rock fill and buttress designs are about equal in cost, but the buttress type is dependent upon cement supplies, and there has been some difficulty because of this. Material for rock-fill dams comes largely from the associated tunnels. Another method of saving cement is to substitute a mixture of 7 parts blast furnace slag and 3 parts cement.

Amenity considerations constantly affect designs. The controlling act makes provision for both an Amenities Committee and a Fisheries Committee, and both these are active. The results are apparent in various schemes for helping fish past dams, the burying of pressure pipes, and the use of stone for station buildings.

In conclusion, Sir Edward dealt with the possibility of using as a source of fuel Scotland's 2,000 sq miles of peat bog. Gas turbines could supply the answer, and there seemed a possibility that some form of hydraulic compressor, utilising water power to compress air, could replace the compressor stages of these, with a 150% increase in power output.

BRUNSWICK WHARF CANTEEN

A KITCHEN, capable of providing over 1,000 main meals and snacks daily, was provided almost from the outset at the new Brunswick Wharf, Poplar, generating station, and is supplying meals to the many hundreds of different trades and professions occupied in construction.

The canteen, which will be taken over eventually by the permanent staff of the station, contains more than 200 kW of cooking equipment supplied by the General Electric Co., Ltd., to a scheme prepared by Miss C. E. Cassidy, B.E.A. group canteen supervisor. This includes four 12 kW dual purnose vegetable boilers, four 9 kW 6 cu ft steaming ovens, four 4·8 kW general purpose ovens, two 12·4 kW boiling tables, one 12 kW cabinet roaster, and three 18 kW two-pan fish fryers. There are also a 14·4 kW 3-deck pastry oven in the bakery, an 8 kW griller-toaster in the servery, and 200, 50, and 20 gallon water heaters. There is also a complete ventilation system, with a 48 in. axial flow fan for general service with a separate 15 in. fan and automatic damper system for the fish fryers. In addition, 45 kW of hot-cupboard, cafeteria and servery equipment, with the sink work was supplied by Gardiner and Gulland Ltd., of Hither Green.

General view showing boiling pans, steaming ovens, boiling tables and fish fryers

Crossing the Wyre

REINFORCEMENT of the h.t. network in the Fylde district of Lancashire has recently involved the laying of two 33 kV 0·3 sq in. cables across the Wyre estuary at Fleetwood. Manufactured by British Insulated Callenders Cables, and installed by B.I.C. Construction Co. in conjunction with the North Western Board, the cables were made in single lengths of 1,130 yards to eliminate under-water joints, necessitating two 12 ft dia. drums, each 8 ft wide—believed to be the largest ever built—for their transport from Erith to the site, a 250-mile four day journey.

On the Fleetwood side of the estuary a wide expanse of mud flats is exposed at low water; at spring tides, a channel only 100 yards wide remains near the Preesal bank at low water.

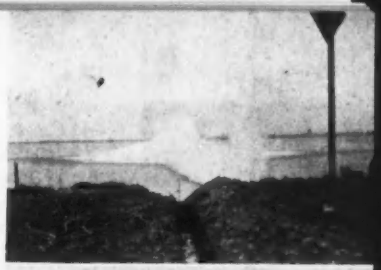
The two power cables were to be laid at a distance of 50 ft apart, with a telephone and pilot cable alongside the downstream power cable. Across the 100-yard stretch of channel a minimum depth of 1 ft, and over the remainder of the crossing a depth of 3 ft were specified.

The blasting of the trenches in the river bed was one of the first operations undertaken, and about 50 yards of trench were blasted at a time.

Meanwhile, trenches had been excavated on the Preesal side of the river and, at their shore ends, two winches installed, the use of a cable-laying barge being impracticable due to difficult tides.

About 250 yards of the first cable was pulled out towards the water's edge on March 15, and on the following day at 2 p.m.—approximately three hours before high tide—the pulling operation across the water was commenced.

The oil-drum floats were attached to the cable at 9-ft intervals as it was hauled from the bank at the Fleetwood side, and at 5.30 p.m. the cable was landed successfully on the far bank. The floats were removed as the cable grounded, and the cable was finally made off by the winch at 6 p.m. Due to the short period of slack water, it was not possible to leave the cable right on line, and it was moved to the correct position in subsequent operations. Across the mud flats cover was provided by digging out progressive lengths of trenches and back-filling the soil over the cable during periods of low tide. This lining up and bedding in of the cable, scheduled for completion before the next neap tide, was very adversely affected by weather conditions, the succeeding days bringing heavy rainstorms (as much as 1 in. of rainfall during one 14-hour period) and severe gales, with wind speeds of up to 80 m.p.h. Consequently, it was not possible to begin the second cable-laying operation as planned and it was agreed to pull the cable across the estuary on rollers at low tide during the spring tide period. This operation was successfully accomplished within three hours on April 4, the cable being moved across at a speed of approximately 20 ft per minute. The auxiliary cable was similarly installed on April 6.



Blasting

Cable drums in position

Cable on the mud flats in readiness

Cable at water's edge with oil drum floats

Pulling across

View showing first cable crossing

OPEN DAYS AT THE N.P.L.

Items of Electrical Interest on Show for Golden Jubilee

THE annual "Open Days" at the National Physical Laboratory are a well-known feature of the electrical year. This year, due to the incidence of the Festival of Britain and the postponed Jubilee of the Laboratory—it was founded on January 1, 1900—the Laboratory held, in all, six open days. Wednesday, May 23, was restricted to members of the General Board and selected visitors. On Thursday, staffs of Universities and Government Departments were invited; Friday was reserved for representatives of local organisations and Saturday for the staff. Monday and Tuesday of this week, were selected for visits by representatives of industrial organisations and for parties of foreign visitors.

Work in Hand

The character of the work carried out by the Laboratory, which is of course primarily devoted to the maintaining, comparison, and measurement of the standards of length, mass, time and the electrical and photometric standards, is not in general of a spectacular or sensational nature. Nevertheless there is much to interest the electrical or electronic engineer. The electrical industry as a commercial proposition is wholly dependent on the accuracy of the meters used and thus on the accuracy of measurement of the standard instruments which are used for calibrating these meters. The N.P.L. undertakes the calibrating of such sub-standards and, in the electricity building there were examples of the methods adopted in such work. Demonstrations were also given of the testing of voltage transformers up to 40 kV and of current transformers up to 20 kA. A comparatively recent development is the testing of instruments at frequencies up to 30 kc/s in comparison with standard electrostatic instruments.

Much work is being done on the propagation of radio waves. This has arisen partially because of the use of radio for the measurement of distance—radar forms a specific example of this type of work. Further the interferometry of radio waves is being investigated as a means of measuring short distances. For both these purposes, the refractive index of various media are required. The values already known for light waves cannot be used, as these values differ substantially from those using radio waves.

Measurements have, therefore, been made at a wavelength of 1·25 cm with an accuracy comparable with that of the optical determinations. Results have been obtained separately for dry air and for water vapour, and a formula devised, whereby, the r.i. for any specified atmospheric conditions can be calculated.

A requirement has also arisen for the measurement of dielectric properties of solids and liquids in the region of 300-500 Mc/s, and apparatus for this purpose has been devised using a re-entrant cavity oscillator. An accuracy of $\pm 2 \times 10^{-3}$ has been attained in measurements of the power factors of good dielectrics.

The Electronic Computer

The N.P.L. high-speed automatic electronic digital computer (ACE) is being extended to use a magnetic recording "memory" in addition to the existing delay line system. The binary numbers are recorded on a metal drum which is synchronised to rotate once in nine circulation periods of the delay line, during which time every ninth digit in the line is recorded. There are 1,024 digits in the line so that after nine circulation periods, every digit will have been transferred to the drum and none will have been repeated as 9 is not a factor of 1,024. The digit order on the drum will be different from that in the line, but this does not matter as the transfer back from drum to delay line takes place in one rotation of the drum and nine circulation periods of the line, after which time all the digits will be circulating in the delay line in their correct order.

The pilot model has been extended in scope by the addition of a multiplication unit, and work is still proceeding on the formulation of a library of instructions (in the form of punched cards) for performing various mathematical functions.

Thunderstorm Location

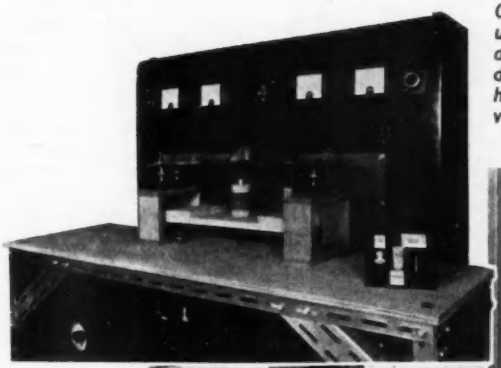
An interesting item is an automatic waveform recorder which has been developed for the location of thunderstorms. This work is particularly important for aircraft flying the Atlantic and is at present carried out by recording the direction of the source of lightning flashes at a number of stations located far apart in the British Isles. The best obtainable baseline, however, is small compared with the Atlantic, and considerable errors are intro-

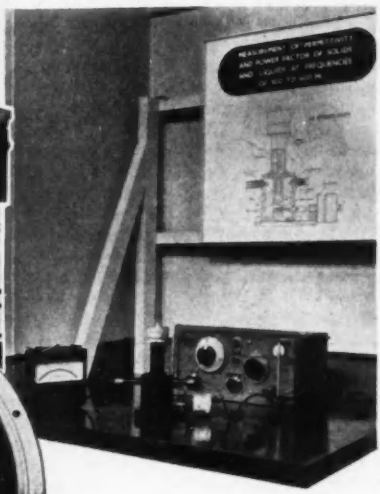
duced due to the acute angle of intersection of the directional lines. The N.P.L. instrument photographs the oscillogram of the atmospheric as displayed on a cathode ray tube. As this shows not only the direct flash, but also the successive reflections from the ionosphere it is possible to deduce, knowing the time base, both the distance of the flash and also the height of the ionosphere.

Although the above details are merely a few of the items of electrical interest, it represents a section of the work being done at the laboratory, at the moment.

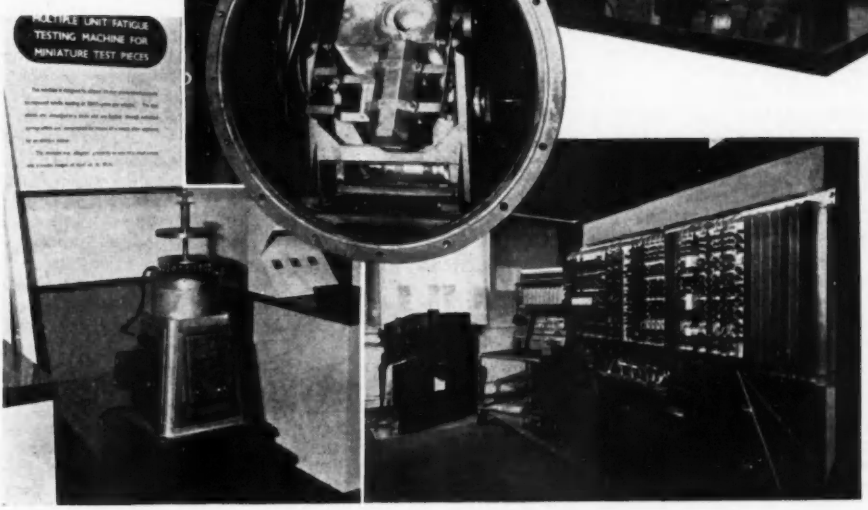
Speaking at a Press Conference, the Director, Dr. E. C. Bullard, emphasised the close bonds between the Laboratory and commerce and, pointed out that there were facilities at the Laboratory of a nature that enabled them to cope with problems outside the capabilities of private concerns. He referred to a recent international symposium which had been held there on standards, as a great success.

On the left is a new light standard, which uses the light from a solidifying platinum as a reference. Below is the set up for determining dielectric measurements at high frequencies and in the centre is a vacuum induction furnace for producing high purity metals





Left below is a multi-head fatigue testing equipment and on the right a general view of ACE



overseas news

Extension Bill

A Bill authorising the extension of the duration of the New Amsterdam Electric Lighting Order, 1900, to 1951, has been introduced in the Legislative Council. The Order which authorises the Mayor and Town Council of New Amsterdam, British Guiana, to supply electricity ceased to have effect on August 22, 1950, and Clause 2 of the Bill seeks to extend the duration of that Order to the end of 1951. The Governor-in-Council is also empowered further to extend the duration of the Order, if necessary, to the end of 1952

Rural Development

Loans totalling £500,000 are to be made to Queensland regional electricity boards to improve services to rural areas. Mr. Power, Minister for Mines, has stated that the Executive Council has approved of loans through the Commonwealth Bank to the Wide Bay, Capricornia, Townsville and Cairns boards. Allocations of £150,000 have been made to Wide Bay, Capricornia, and Townsville and £50,000 to Cairns.

Tasmania seeks advice

Two French technical consultants have arrived in Tasmania to give advice on Hydro-Electric Commission projects. They are the honorary professor of geology at the Sorbonne, Paris, Dr. C. Jacobs, and M. A. Pearson, head of the Hydro-Electric Division of the Schneider Co. That company has the contract for tunnelling at the Trevallyn hydro project. The State Premier, Mr. Cosgrove, has said that the Hydro-Electric Commission had arranged with the Schneider Co. to review the proposals prepared by the technical staff of the Commission. The proposals shortly would be the subject of a report to the Government and would involve the expenditure of a considerable sum of money.

Getting into hot water!

A new traffic has suddenly sprung up in Melbourne, according to reports. It is in labels authorising the connection of electric water heaters! The label system was introduced by the State Electricity Commission of Victoria about two years ago, when it was decided to ban electric water heater service connections from June 30, 1951. The Commission will connect, after that date, any new services for which labels have been granted, but no more labels will be issued. And now there are reports that these labels are being offered for sale for as much as £40 each. Apparently, the Commission has detected many attempts to beat the restriction by defacing labels and even by removing the outer casing of a service on which the label was fixed. This was then used as a sheath for a new tank. The S.E.C. will sanction the transfer of a label only if it is accompanied by the entire original hot water service.

The Manitoba Plan

Manitoba's re-organisation Bill providing for the establishment of a Hydro-Electric Board has received its third and final reading in the Legislature. Little change has been made to the clauses, but one amendment which was accepted provides for the public hearing of proposals to fix bulk supply charges, any appeal being made to the Cabinet. (Under the Bill, the Hydro-Electric Board is given authority to purchase all power produced in the province at its own price, pool it, and resell it back to the distributing utilities at an equalised price. The purpose of this authority is to equalise the price of high and low-cost power in the province.)

The role of the Winnipeg City Hydro in the new organisation is not yet settled, for the Council has under consideration a plan for the establishment of a Greater Winnipeg Public Utility Board (as we reported on May 10). A referendum on the matter is to be submitted to the ratepayers; and, apparently, if the ratepayers reject the proposal, it will be necessary to revert to Plan "D" under which the City Hydro and the Winnipeg Electric Co. would continue to function, but in a three-way power pool with the Government which would control the sale and transmission of power. But the State Parliament has prorogued, and when the decision is known a special session will be called.

Power for Smelting

Decision to build a 205,000 h.p. power plant in British Columbia at an estimated cost of $30,000,000, was announced by R. E. Stavert, president of The Consolidated Mining and Smelting Co. of Canada, Ltd., at the annual meeting of the company's shareholders, a few days ago. The plant is to be built on the Pend d'Oreille River about 12 miles from Trail. It will operate under a head of 200 ft and will consist of two units. Plans will provide for the installation of two additional units of a similar size as and when required. The design and construction of the plant will be under the supervision of Stone and Webster, Canada Ltd. It is hoped that the plant will be ready for operation early in 1954.

Canadian Electrical Code

During the course of a four-day meeting of representatives of the Canadian Standards Association earlier this month, a revised procedure was adopted for compiling the sixth edition of the Canadian Electrical Code, which is now in process

of being assembled. Mr. S. A. B. Kembry, chief electrical inspector of the Department of Industries and Labour, Alberta, has succeeded Mr. W. P. Dobson, director of research, Hydro-Electric Power Commission of Ontario, as chairman of the committee on part one of the Canadian Electrical Code.

Bhakra Project

Laying the foundation-stone of Bhakra dam recently, Chief Minister of the Punjab said that 1956 had been fixed as the deadline for completion of the project, provided that funds are available from the Central Government and equipment from abroad. He hoped the Nangal hydel canal and power house would be completed by 1953 which would enable them to supply electricity to Delhi. Visualised first in 1908 as a storage reservoir dam on the Sutlej, the Bhakra-Nangal scheme was projected in 1919. The project was revived in 1932 revised in 1940 and 1946 and the final shape was, given in 1949. The project comprises the Bhakra dam with its two power plants, the Nangal dam for feeding the Nangal channel on which are situated three power stations of a total capacity of 164 MW, and the Bhakra irrigation system.

New Power Body

A new organisation, called the Central Water and Power Commission, amalgamating the former Central Electricity Commission and the Central Waterpower, Irrigation and Navigation Commissions, has now been set up by the Government of India. The Commission is to consist of a chairman and four members (two directing the Water Wing and two the Power Wing) with other members as may become necessary. The personnel of the new Commission comprise: Shri A. N. Kholsa, I.S.E. (chairman); Shri Man Singh, I.S.E.; Shri Kanwar Sain, I.S.E.; Shri S. A. Gadkary; and Dr. K. P. P. Menon.

Development

An expenditure of £63,000 in developing the city's transmission and distribution network has been recommended by the Kimberley General Purposes and Finance Committee. The development is necessary to cater for future growth of the city and to comply with the agreement entered into by the city council with the Electricity Supply Commission of South Africa. A project specification for the development of the h.t. network has been prepared.

Nigerian Expansion

All Nigerian Government electricity undertakings have now been transferred to the Electricity Corporation of Nigeria, whose London office is at the Corner House, Great Peter Street, S.W.1, where Mr. E. C. Inston is in charge. Plans are in hand for extensive development schemes with ultimate intention of providing an up-to-date network to supply all provinces in Nigeria.

Some 40 stations have been taken over. Chairman of the new corporation is Mr. J. H. Angus, M.I.E.E., whose appointment we noted in our August 31, 1950, issue. Mr. H. Batty, M.I.E.E., is acting chief engineer.

Another Development

The Que Que town Council, Southern Rhodesia, has authorised the town clerk, Mr. J. H. McIntosh, to take the usual steps to secure a loan of £100,000 for a programme of modernising the town's electricity. The scheme was drawn up in collaboration with the council's consulting electrical engineers by the town engineer, Mr. J. G. King. The programme is spread over four years.

No Extension for King's Wharf

The New Zealand Government does not propose to extend the King's Wharf power station, Auckland, on its present site because of the cost and other disadvantages, the Minister in charge of the State Hydro-Electric Department, Mr. W. S. Goosman, has revealed. The report of the engineering consultants who examined the proposal for extending King's Wharf station, consider that a 30 MW addition to the present site is practicable, but the existing buildings and foundations could not readily be used for large-capacity plant. And while rail connections and water supplies are reasonable, the site imposes severe limitations in the storage and handling of coal. Installation of the plant, also would take 3-3½ years. The estimated all-in cost of making improvements to the existing station are: complete scheme, with dual coal and oil firing, £1,730,000. Modifications: (a) with provision for coal firing only, £1,660,000; (b) with provision for oil firing only, £1,210,000; diesel house service plant (if required), about £35,000. Mr. Goosman has said that the suggestion, that an additional source of power could be installed quickly and economically is not borne out by the report. The conditions of the existing site make it most undesirable to perpetuate a power station that would not be tolerated if it were proposed there today. A reasonable conclusion must be that if a fuel-fired station is required, it should be erected on a more suitable site than King's Wharf. Such possible sites will be considered after the investigations in progress have reached a suitable stage. These investigations, comprising a search for geothermal steam and a coal survey, will reveal the basic facts needed by the engineers before firm proposals can be made to the Government.

Flood Trouble

Recent floods in the South Island, New Zealand, to which we have already made reference, so damaged the Rangitata diversion race that feeds water to the Highbank hydro-electric station, that that station was temporarily put out of action. Other power lines, too, were cut, and many parts of South Island experienced several days of severe power restriction. Chief town to suffer was Christchurch.

PERSONALITIES

IN THE INDUSTRY

S. Smith and Sons (England) Ltd. announce the appointment of **Mr. F. J. Hurn** and **Mr. D. W. Barrett,** to the board. Both have been associated with the firm for many years, Mr. Hurn as director and general manager of Smiths Motor Accessories Ltd. and Mr. Barrett as director and general manager of Smiths English Clocks Ltd.

Taking up his new appointment as station superintendent at Kingston "A" and "B" power stations of the South Eastern Division of the B.E.A. as from June 1, is **Mr. H. Hyde,** A.M.I.E.E., Assoc. I. Mech. E., who for the past fifteen months has been deputy station superintendent at Valley Road, Bradford, power station, Yorkshire Division. Obtaining technical education at Birmingham Central Technical College and Smethwick Technical College, he joined the former Midland Electric Corporation for Power Distribution in 1920, passing through the mains, test and power station departments. In 1932 he was appointed control engineer to the West Midlands J.E.A. for the commissioning of Ironbridge power station, where he later became combustion engineer. It was in July 1946 that he went to Bradford, as operation engineer at the Valley Road power station, being promoted to turbine house superintendent in 1948 and deputy station superintendent in April 1950.

Mr. H. Hyde

Mr. Stanley Prescott has resigned from the board of the General Cable Manufacturing Co.

Two new directors have been appointed by the Government to the Eire Electricity Supply Board. They are **Mr. J. D. Rush,** well-known for his work in the Irish Sea Fisheries Association, and **Mr. J. A. Ryan,** a director of Messrs. John Power and Son, Ltd., Dublin distillers. These new appointments bring the Board up to full strength, with a chairman and six members.

Mr. W. E. Betts, Associate I.E.E., is terminating his employment with Crompton Parkinson, Ltd., after 25 years, and joining the staff of Switchgear and Equipment, Ltd., as sales manager. He served his apprenticeship with Crompton and Co. and Crompton Parkinson, Ltd., and subsequently specialised on switchgear for the company. Mr. Betts has served in various parts of the country and also on works estimating and contracts. His technical education was obtained at Chelmsford Technical School.

Relinquishing his duties as managing director of J. and H. McLaren, Ltd., **Mr. V. J. Chalwin** is leaving England to take up the managing directorship of the whole of the A.B.O.E. Group's activities in Australia. **Col. H. T. Thornley** will take over the duties for which Mr. Chalwin was formerly responsible.

Mr. H. Marshall, B.Sc., has been appointed deputy technical manager to Scottish Cables Limited, Renfrew. Receiving his technical education at King's College, Newcastle - upon - Tyne, and practical training with C. A. Parsons and Co., Ltd., and A. Reyrolle and Co., Ltd., Mr. Marshall has held positions with the Ministry of Supply and Messrs. Merz and McLellan, Newcastle-upon-Tyne, from whose staff he resigned on taking up his new appointment.

Mr. H. Marshall

Shri T. N. Idnani, B.Sc. (tech.), M.I.E.E., has been appointed secretary to the Indian Central Electricity Authority. He was previously senior project officer with the Central Electricity Commission.

Today, May 31, sees the retirement of **Mr. L. V. Turner,** M.I.E.E., from the post of Taunton Sub-area manager for the South Western Electricity Board, which he has held since vesting day. As we have already recorded, Mr. Turner has a long association with Taunton. His apprenticeship was served with Newton's Ltd. in that town, and after a short time at Croydon, and with Vickers Ltd., he returned to Taunton in 1919, joining the staff of the Corporation Electricity Department as meter superintendent. He successively became mains superintendent, deputy borough electrical engineer and manager, and, in 1936, borough electrical engineer and manager. After 40 years service in the industry, we hope he enjoys a long and happy retirement. His successor is **Mr. E. A. Newburn,** M.I.E.E., whose promotion we have already noted in our April 5 issue.

Mr. L. V. Turner

Preparing for expansion of the system's activities, the Toronto Hydro-Electric System recently announced three appointments as part of the reorganisation of the administrative staff. **Mr. J. S. MacGregor** becomes assistant general manager, **Mr. C. E. Schwenger** is named chief engineer and **Mr. D. G. Moffit** becomes secretary to the Toronto Electrical Commissioners. The imminent conversion of the frequency from 25 to 60 c/s is a factor in the reorganisation.

Mr. R. Mallet, B.A., M.I.E.E., whose appointment as sub-area manager of the Worcester and District sub-area of the Midlands Electricity Board, we briefly noted last week, succeeds **Mr. R. Randall,** M.I.E.E., who resigned at the end of March. Mr. Mallett received his education at Eastbourne College and Cambridge University. After three years' student apprenticeship with B.T.H. at Rugby, he was for a short period with the L.M.S. Railway at Euston as assistant engineer. His subsequent experience was obtained with the West Cambrian and Carmarthen undertakings, H.M. Devonport Dockyard, the Buckrose Light and Power Co., South East Yorkshire Light and Power Co., and at vesting day he was manager of the Redditch district of the former S.W. and S. Electric Power Co. In May 1948 he was transferred to the headquarters of the Midlands Board, and subsequently appointed deputy chief engineer.

Mr. R. Mallet

Retiring from the position of chief engineer of Evershed and Vignoles, Ltd., **Mr. G. B. Rolfe,** B.SC.ENG.(HONS.), M.I.E.E., has been appointed a director of that company with which he has been associated for 43 years. After leaving King's College, London, Mr. Rolfe was for a time with the British Westinghouse at Trafford Park (now Metropolitan Vickers), joining Evershed's in 1908. An assistant for a number of years to the managing director, he was particularly concerned with the expansion of the factory and the introduction of new production methods. He has always been closely associated with technical questions arising in design and manufacture; in 1922, he developed the popular Series 2 insulation tester. The following year he became development manager being responsible both for fresh applications of instruments and for the company's production plant. Another of Mr. Rolfe's designs, the "Wee-Megger" tester, was first marketed in 1932. In 1941, he was appointed chief engineer and was largely responsible for the plant switch-over to production of instruments for H.M. Forces. More recently, he developed a range of special duty f.h.p. motors and a new model of insulation tester —the Series 4, which came into production last year. Now that he has severed his day to day connections with Evershed's, Mr. Rolfe will live near Bournemouth.

Mr. F. D. Felton has been elected a director of the Revo Electric Co.

At a recent ceremony at the Trafford Park Works of W. T. Glover and Co. Ltd., **Mr. Martin Harvey,** chairman, presented a £50 cheque to each of three members of the company, including Mr **H. M. Crellin,** test manager, who had completed 50 years service.

Following the untimely death of Mr. W. J. **Bensley,** president of the Electrical Wholesalers Federation, **Mr. G. W. Cartwright,** of John T. Cartwright and Sons Ltd. Glasgow, has been elected to that office for the current year. Mr. George Cartwright, one of the three sons of John Cartwright, founder of the company, is the present managing director of the company, and has been a general Councillor of the E.W.F. since 1948. He has always been keenly interested in Federation affairs and was secretary of the Scottish Section in 1935 and 1936 and chairman in 1937 and 1950. On the retirement of Mr. Glenister he became Scottish Section Councillor. He served his training as an electrical engineer at Garbe-Lahmyer Gesellschaft at Aachen, Germany, where he received a diploma. Prior to that he had served a five years apprenticeship with the Macfarlane Engineering Co. Ltd., of Glasgow.

Mr. G. W. Cartwright

Mr. Richard Clements, B.SC., who has been press and public relations officer for Exide and its associated companies for the past three years, is giving up that position from the end of June to devote his full time to his farm in Hertfordshire. In his spare time he is to work on a new edition of a popular book on chemistry, Tilden's *Chemical Discovery and Invention in the Twentieth Century.* He was, of course, a former editior of *The Chemical Age,* and science correspondent of the *Daily Mirror.*

Mr. R. Clements

Councillor Miss Norah Balls, J.P., of Tynemouth, has been appointed vice-chairman of the Electrical Association for Women National Executive Committee, on which she has served for many years. Miss Balls has been a member of the Association for about 25 years, and was a founder member

and first chairman of the Newcastle and District branch. She is well-known in the North of England not only for her interest in the E.A.W., but for her many other activities in civic and social affairs, especially those concerning women. She is a part-time member of the North Eastern Electricity Board.

Two months after completing a year of office as president of the Dorking and District Chamber of Commerce, **Mr. S. J. Clear,** of the electrical and radio engineers of that name in the town, has been elected vice-president of the Rotary Club of Dorking. He will succeed to the presidency next year.

Deputy station superintendent at Kilmarnock generating station, South West Scotland Division, B.E.A., since 1948, **Mr. O. R. Jones** has been promoted to station superintendent there. Prior to joining the old Ayrshire Electricity Board as shift charge engineer at Kilmarnock in 1944, he served with the Hammersmith and Sutton Coldfield Corporation undertakings and with the West Gloucester Power Co.

An interesting ceremony took place in one of the Metrovick canteens last week, when the managing director, **Mr. I. R. Cox,** D.S.O., presented gifts from the company to 165 employees who, during the year 1950, had completed 35 years service. It was the fourteenth of these annual presentations, and the company has now a total of 1,400 employees of 35 years standing and over. This year's recipients, among whom were nine women, had the choice of a Westminster chimes clock, an E.P.N.S. tea service, a canteen of cutlery or National Savings certificates.

OBITUARY

Mr. F. W. Maynard, mining representative for A. Reyrolle and Co. Ltd. in the Midland Divisions, died on May 23. He had devoted his life to mining, electrical and mechanical engineering problems, and, before joining Reyrolle's, had been employed as chief engineer to colliery companies both in the Midlands and on the North-East Coast.

Mr. F. P. G. Telfer, M.C., M.I.E.E., latterly with the Ministry of Supply, died on May 27, aged 53. Prior to the last war he served with the M.O. Valve Co., Ltd., Hammersmith, for fourteen years.

Mr. Harold Baird, district manager for Manchester to the Sloan Electrical Co., Ltd., died on May 27, aged 63. He joined that company in 1907 and for 31 years was chief representative in Lancashire and Cheshire, being appointed district manager at Manchester in 1938.

Mr. H. J. Hadrill, A.M.I.E.E., district manager of the Wallasey district of No. 3 sub-area of the Merseyside and North Wales Electricity Board, died on May 27, aged 57. He joined the former Wallasey Corporation electricity undertaking in 1919, and immediately prior to vesting day was mains engineer with that undertaking.

Mr. N. S. Sim, M.C., A.R.T.C., A.M.I.F.E., of the English Electric Co., Ltd., Stafford, died on May 12, aged 65. Educated at Robert Gordon's College, Aberdeen, and gaining technical education at Royal Technical College, Glasgow, he graduated B.Sc. (Engineering) at Glasgow Univeristy in 1910. Apprenticed with Hall Russell and Co., Ltd., and the British Electric Plant Co., Ltd., Alloa, he later spent nine months in the switchgear drawing office of Mavor and Coulson, before joining the A.C. Design Department of Siemens Bros. Dynamo Works, Ltd., at Stafford in April 1911, where he remained till he joined the army in September 1914. Returning to the A.C. Design Department of Siemens Works, Stafford, he served in the Central Design Department of the English Electric Co. from September 1921 till October 1925, when the design department was transferred to the Stafford Works of The English Electric Co., Ltd. From that date to the time of his death he remained in the A.C. Section of the Machine Design Department, Stafford.

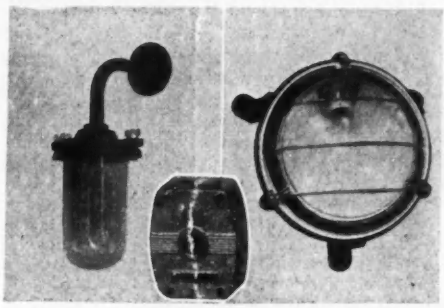
The death occurred on May 24, his 65th birthday, of **Mr. H. Coates,** M.I.E.E., F.I.I.A., director of Watford Electric and Manufacturing Co., Ltd., who held the position of sales organiser. His elementary, secondary and technical education was gained at Salford and Manchester, and training as a special pupil with Mather and Platt, Ltd. After five years' workshop training and two and a half years in their drawing office, he entered the Switchboard, Layout and Estimating Department of Ferranti Ltd. in 1908, and became their switchgear specialist. He spent some time in Germany studying large switchgear schemes, and became associated with the Watford E. and M. Co. in 1915, where he had served ever since. He had a number of patents to his credit, their subjects including maximum demand control and electric furnace control. At Watford he was also a prominent civic figure, being a member of the Council since 1922, and mayor twice. He was also chairman of the Corporation Electricity Committee for 25 years, chairman of the Colne Valley Sewerage Board, and a member of the Eastern Electricity Consultative Council.

We note the death, on May 26, of **Mr. J. B. Collinge,** aged 84, who served for 30 years with the Salford Corporation Electricity Department, retiring from the position of superintendent of power stations in 1931. In 1901 he took charge of the Wallness power station, and later went to the Frederick Road station, but it was in connection with the development of Agecroft power station, under his direction, that Mr. Collinge became more prominent in the industry, and to him much of the credit was due for its high thermal efficiency. Born in Edinburgh, he went to the English School, Dalkeith, and served an apprenticeship at the Lee Brook Foundry, Rawtenstall. He was later employed, and held a responsible position, in the drawing office of Messrs. Woods, engineers, of Bolton, from whence he subsequently moved to Salford.

The BUYER'S *Column*

Weatherproof Fittings by McGeochs

THE production and design of waterproof lighting fittings is a subject in which WM. MCGEOCH AND CO., LTD., Warwick Works, Coventry Road, Birmingham 10, are well versed. As a firm established in 1832, they have had years of experience in this business, so one may rest assured that "McG." fittings are well designed, efficient and durable units.



Sturdiness is the keynote of McGeoch design

Quite recently the company has introduced a new range of lighting fittings, bulkhead fittings and switch assemblies for which good delivery is assured.

The weatherproof fittings are constructed in best grey iron and cover, in the case of bulkhead fittings, a range with clip-in glasses, guarded and with or without feet, for mounting straight or at an angle. There is also a range of weatherproof fittings complete with different designs of angle bracket.

The iron-clad switch assemblies are a departure from the usual style. Available with internal spout entries on 1, 2 and 3 gang boxes, they are finished in black enamel or silver (a cream finish is available at a 10% extra charge). Four-gang boxes have undrilled end pads.

Price Increases

FURTHER adjustments in prices are announced by firms in the industry.

BRITISH NATIONAL ELECTRICS LTD., Charlton, London S.E.7, announce that rising costs of materials and production have necessitated a revision of the prices of their Model C.49 electric cooker and their range of immersion heaters and circulators. The new prices are effective on all goods invoiced after May 30. The prices of the Model C.49 cooker are now: three-plate, without fuses, £31; two-plate, without fuses, £28 10s.; extra for drawer unit, £1 10s. The prices of certain accessories and spares have also been increased. A new price list for B.N.E. immersion heaters and circulators will be supplied on request.

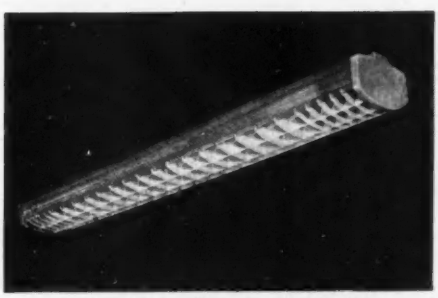
EASCO ELECTRICAL, LTD., Brighton Terrace, S.W.9, announce changes in price of their range of "Callboy" and "Rectostat" units. They are effective as from May 1 and are as under:—

	£	s.	d.
Standard 2-way Communication "Callboy" Units			
E.13AT Master Unit, 10-way ...	18	7	6
E.15AT Master Unit, 9-way ...	19	8	6
E.18 "Add-on" Unit, 20-way ...	7	7	0
E.19 Master Unit, 10-way	18	18	0
E.14 Sub-station	4	14	6
E.16 Sub-station	5	5	0
Full Inter-Communication Units—De Luxe Series			
E.20 Master Unit, 6-way	23	2	0
E.21 Master Unit, 10-way	28	7	0
E.22 Staff Station Unit	12	12	0
E.23 Private Sub-station	7	7	0
E.28 Dual Master Oscillator Calling	21	10	6
E.30 Dual Master Buzzer Calling...	21	10	6
Rectostat Battery Chargers			
D.17 Charger, 3 amp.	8	12	6
D.18G Charger, 1 amp.	4	10	9
D.19 Charger (2-circuit), 6 amp. ...	18	2	3
D.20 Charger, 2 amp.	6	6	6

Brightness by S & B

LF.25 is the catalogue number of this new fitting introduced recently by SMART AND BROWN, ENGINEERS, LTD., Trading Estate, Spennymoor, Co. Durham.

It is a fitting, designed for use with twin 5 ft, 80W fluorescent lamps, which incorporates an easily released self-aligned bottom louvre with graduated cells, reducing in size at each end. Glass side panels permit extra light emanation.



An elegant fitting is the LF.25

Control gear, comprising "Hi-Craft" ballast units and cannister type starter switches, is housed in the backbone concealed by the reflector. The starter switches are easily accessible from the side of the fitting.

Erratum

IN our issue of May 17 we noted that white covers for their electric blankets were no

longer available from THE WARM GLOW CO. LTD. of 113 London Road, Leigh-on-Sea, Essex. This is an error on our part. Bleached calico covers are still available, although the electric blankets themselves are no longer supplied in white blanket cloth.

G.E.C. Emergency Lighting Unit

A NEW emergency lighting unit, which provides immediate and automatic illumination of premises when normal lighting is interrupted, has been introduced by THE GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, W.C.2. A spotlight on the unit contains an Osram 6 V headlight bulb, which is connected instantly by means of a relay to an Exide battery if the mains supply fails. In normal circumstances the battery is kept charged from the a.c. mains by means of a built-in automatic charger incorporating a G.E.C. selenium rectifier. Restoration of the supply after a failure automatically switches off the emergency lighting and causes charging of the battery to be resumed.

Two 5-amp sockets on top of the case enable two lamps up to 60 W total to be installed remotely if desired, or the lamp on the unit may be used in conjunction with one other in a remote position.

The built-in automatic charger will restore the battery to the fully charged condition within 40 hours after a full discharge. Should there be a further breakdown of the supply, the battery, after complete discharge, will be capable of operating a single lamp for a short period after 10 to 15 hours' charging.

The unit is supplied with 10 ft of three-core t.r.s. cable for connection to the mains, and is for operating on a.c. supplies of 100/120 V or 200/250 V, 40 to 100 c/s.

Column Type "Dimplex" Radiators

FOR use where space does not permit the use of the company's normal panel type radiators. DIMPLEX, LTD., Dimplex Works, Totton, Hampshire, have now developed a column-type unit.

Standard models for a.c. supplies only are fitted with combined thermostat, pilot light and excess temperature cut-out only. Available with loadings of 1½ and 2 kW, the radiators have dimensions and capacities as follows: 26⅝ in. x 24 in. high, and 35⅜ in. x 24 in. high; 1,500 and 2,000 cu ft heating capacities respectively, and prices are (also respectively) £17 plus £12 8s. 8d. tax and £21 plus £15 7s. 2d.

Standard colour is light bronze; also available without extra charge are the following finishes: Gold, cream, white, silver grey, sky blue, eau de nil and black. Castor wheels can be fitted at an extra cost of £1 7s. 6d. plus £1 purchase tax.

Dimplex, Ltd., stress that although this model will be available from July 1, they regret that due to an acute shortage of steel, only extremely limited supplies will be forthcoming.

Erie Type 135 Miniature Trimmer

THE Type 135 trimmer, which has been specially developed by ERIE RESISTOR, LTD., Beevor Road, Great Yarmouth, to meet rigid Service requirements, is claimed to be the first fully sealed and fully tropical trimmer to be produced in this country. It is designed to operate over a temperature range from —50° C. to +100° C., and the seal is effective against vacuum and a pressure of two atmospheres. Provision is also made for a panel-seal.

Specification.—Capacity ranges, P.080 temp. coeff. 1-12 mmfd; N.750 temp. coeff. 3-50 mmfd. Maximum diameter, 0·5 in. Depth below panel, 0·5625 in. Height of bush above panel or chassis, 0·5 in. Adjusting screw projection above bush, 0·375 in. maximum, 0.125 in. minimum. Thread, 6BA. Method of adjustment screwdriver slot.

Anti-Vibration Pipe Clips

METAL clips with an inner surface of rubber (bonded to the metal) serve a double purpose of affording an extra measure of both electrical and mechanical insulation. Such a range of clips for securing cables, pipes and conduits, is available from HOWARD CLAYTON-WRIGHT, LTD., Wellesbourne, Warwickshire.

These "Clatonrite" Anti-Vibro clips are listed in two types—a plain clip type, A/9373, assuring electrical insulation as well as proof against shock, and another, A/9381, serving to absorb shock yet providing electrical contact through a metal tongue. For normal pipe diameters from $\frac{3}{16}$ in. to 1⅛ in., the prices range from 9d. to 1s. 5d. each.

Work Made Easier

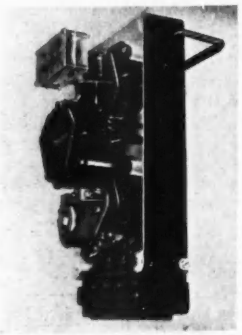
"MICROLOID," claimed by the makers, BRITISH INDUSTRIAL PRODUCTS, Selwyn House, London W.C.1, as the "perfect dry lubricant," is a quick drying suspension of colloidal graphite in a non-inflammable carrier. The advantages of colloidal graphite as a lubricant and a conductor are most apparent when used for electrical instruments and apparatus.

"Microloid" is applied to surfaces, cleansed of oil, with a soft camel hair brush. It then dries rapidly leaving a dry lubricant film which will not rub off or collect dust. The colloidal graphite in the preparation will withstand extremes of temperature and will continue to lubricate long after oils and greases have become ineffective.

An added advantage of the preparation is in transmission work where the graphite will "bleed" off static charges from rubber, canvas and leather driving belts. Microloid is available in handy screw cap pots at 4s. each.

E.E.'s Polyphase Watt-hour meters

THE rapidly extending use of three-phase supplies for factory loads and the increasing demand for metering three-phase supplies at new substations and generating stations, have caused ENGLISH ELECTRIC to extend their integrating meter facilities to embrace two new polyphase units, the types UWG and UWF. The former is suitable for three-phase four-wire circuits, while the latter is suitable for single-phase three-wire, two-phase three-wire, two-phase four-wire and three-phase three-wire. They are available for direct connection to circuits up to 600 V and 50 amps whole current at 50 c/s, and have an error of less than +0·2%, —0% over the range 10% to 125% of rated current at unity p.f. and of +0·4%, —0% over the range 15% to 125% of rated current at 0·5 p.f.



Meters with covers removed to show construction

Construction is generally similar to that adopted for the company's existing single-phase meters, a ball-type bearing reducing the servicing to a minimum. Full compensation for temperature, voltage and frequency variation is provided. In order to make the instrument suitable for different c.t. and p.t. ratios, gears are available for practically every combination, and recalibration is unnecessary. The register has a friction effect of only 0·3 to 0·5% at one-twentieth load.

The meter-case consists of a die-cast base and cover of aluminium alloy, giving rigidity and dimensional accuracy with minimum weight. Provision is made for sealing the main cover independently of the terminal cover. Magnets are of one piece construction to ensure identical characteristics and permanence of calibration. Full adjustment is provided, arrangements being made for light-load, torque balance, brake-magnet, and inductive load.

Full details of these meters are given in publication MS/1101 now available from the English Electric Co.

NEW LITERATURE

Wireless and Electrical Traders' Year Book

FOLLOWING the trend with the emphasis on television, considerable space has been devoted in the twenty-second edition of the year book to matters related to T.V. Starting with a map of estimated service areas of the ten T.V. stations planned by the B.B.C, and station data, it includes condensed specifications of current commercial receivers (with such facts as valves, i.f. values, etc.) and information on valve and c.r.t. base connections, similar in style to its other regular feature covering current radio receivers. There follows the usual list of trade addresses, proprietary names, and a classified buyer's guide (on distinctively coloured papers for ease of reference) in addition to other normal sections such as legal organisations, etc., to complete an up-to-date book of reference, which is regarded as invaluable by all progressive electrical radio traders. Published by Trader Publishing Co., Ltd., Dorset House, Stamford Street, S.E.1, 292 pages, 8¾ in. by 5½ in. Price 10s. 6d.

Chromium Plating

by E. S. Richards.

ALTHOUGH electroplating technique has benefited enormously from the researches of the chemist and the metallurgist, it remains in essentials an art, with all the dependence of success on attention to small details that is implied in that description. Mr. Richards devotes his valuable book to those small details so far as chromium plating is concerned, and the result is a valuable reference volume for operators and production engineers. As well as dealing with the actual plating and polishing operations necessary to the production of a high-class finish, he gives a critical description of equipment which should increase the value of this work to the student. Published by Charles Griffin Ltd., 154 pages, 8 in. by 5¼ in. Third edition, Price 17s.

Television Receiving Equipment

by W. T. Cocking, M.I.E.E.

AS the television service expands further afield from London there is an increasing demand for literature on the subject of receivers. The third edition of this book, which has been completely revised, covers this very satisfactorily, and the approach being non-mathematical, much of its complication is reduced.

Although the technique is a little different, vision reception has a great deal in common with the more usual sound reception methods, and the author has maintained this comparison in his treatment of the receiver itself. There are chapters on both electric and electromagnetic deflection systems with an additional section on deflector coils. Fly-back e.h.t. is also dealt with in some detail, and a good deal of space has been devoted to saw-tooth generators. Interference suppression and the aerial have each been given individual chapters. A series of appendices gives the previously omitted mathematics. Published by Iliffe and Sons, 375 pages, 8½ in. by 5½ in. Third edition, price 18s.

THE WEEK

COMMERCE *in news* INDUSTRY

French licence-free Imports

THE extension and some modifications of the list of goods which may be imported into France free of licence have been announced. All concessions carry the proviso that the goods originate in and are directly imported from countries participating in the O.E.E.C., or from their dependant overseas territories. Those products which have been added to the general list of licence-free goods include rectifiers, insulated wire and cables, components of turbines, motors, pumps and compressors, and glass bulbs for electric lamps and valves. Parts and components of hoists, lifts, lowering apparatus, winches and capstans have been deleted from the Replacement Parts list and transferred to the general list. Provisions of the French announcement took effect as from May 21. Details and a complete list of products affected may be obtained from the Commercial Relations and Exports Department of the Board of Trade.

P.T. Exemption on Labels

EXPLANATORY information concerning the exemption from purchase tax of labels, tags, gummed seals and the like, has been given by the Commissioners of Customs and Excise. The exemption is said to apply to articles designed solely for attachment to other objects indicating the name, price, size, or destination of the goods. Other labels which have secondary uses, where, for instance, receipts have been attached, are liable to the tax of 33⅓% under Group 34 (b).

New Tariffs Unjustified

SEVERE criticism of the Midland Electricity Board's new tariffs announced less than two weeks ago (see our May 24 issue), has already been forthcoming from a local Association and the West Bromwich Town Council. The Association claimed that the new charges were drastic, unfair and unjustified, and has advised its 2,000 members not to allow Board officials to count the rooms in their houses until the Board had met a deputation. Under the new arrangement, the cost of electricity is to be based solely on the number of rooms in each house, and the protestants maintain that this would at least double electricity bills in most working-class households. In addition to the supposed 50% increase in the cost of electricity, the deputation would also point out that the Board had as yet produced no justification for such drastic charges, although a slight increase was expected. It was suggested that before the tariff became operative, the M.E.B. should satisfy consumers by statistics that these high charges were necessary.

The West Bromwich Council, which met last week, declared that the tariffs were unreasonable, unjustified and would create hardship. Besides addressing its protest to the M.E.B., the Council has also sent copies to the Prime Minister, Minister of Fuel and Power, its M.P. and neighbouring councils.

Token Strike for more Pay

FITTERS employed by the Midlands Electricity Board staged a token strike last Wednesday because their pay, they claimed, was 2½d. an hour less than that of fitters employed by private contractors. Some 220 men at four Birmingham depots went on strike. It is understood that requests for a 10% increase in pay, made in April, had been ignored. A spokesman for the men stated that they had received one small increase during the past three years, yet the Board had implied that because of wage increases, tariffs had also to be raised.

Report on de-frosting Experiments

RESULTS of three years' experimental work with soil warming equipment, carried out by the St. Ives Board of Greenkeeping Research Station at Bingley, Yorkshire, were announced last week. The tests were made with low voltage soil warming in a number of areas and, broadly, results have shown that although equipment is costly, it provides a solution to frost-bound ground. As was to be expected, sports officials have shown considerable interest in this research, notably football, rugby and greyhound organisations, which are invariably hard hit by severe frosts. After these authorities have considered detailed reports, further discussions will take place and the possibility of practical installation investigated.

For the purpose of tests, plots were allowed to freeze to a depth of four or five inches before soil warming was applied, and it was found that in spite of continued frost, less than two days' warming was sufficient to produce soft turf for the

The First Half-Century

In spite of official discouragement and indifference, Marconi telegraphy is steadily making its way; and it will no doubt presently arrive at the stage of being scheduled as an infringement of the Government monopoly and be mulcted of a 10 per cent. royalty. —*From our issue of May* 30, 1901.

following ten days in spite of more frosty weather. To achieve this, soil-warming wires using a low voltage supply fed from a transformer were sunk to a convenient depth in the ground. An alternative was the use of special cables, armoured and insulated, employing mains current. There was little to choose between the costs of these two installations, but both were high and likely to prove prohibitive for all save wealthy organisations, states the report. Equipment for a football pitch, for instance, would cost about £10,000, installation would be extra, as also would be the cost of electricity used.

Royal Society Conversazione

PERIODICAL reminders of the work that is constantly going on behind the scenes in the field of research are of paramount importance. Most people are inclined to judge work by results and all too frequently demand that those results be quick to mature, a trend which makes the patient plodding of the experimenter the more commendable and recognition of his progress more desirable. An opportunity to view such advancement occurred last week, when the Royal Society held its Conversazione at Burlington House, Piccadilly. Such exhibits—there were 30 in all—as the cold pressure welding of aluminium and the synthesis of large quartz crystals served to remind us that the electrical industry's research laboratories were hard at work, although there was no revolutionary addition to methods and equipment used at present. Research is slow and results not always forthcoming immediately, but such an exhibition closely resembles an annual report in its up-to-date review of activities.

Export of Unattended Transmitters

LOW-POWER broadcasting transmitters, which can be left to operate on their own, are among most recent Marconi export orders. Ten 2 kW models are to be sent to Italy and seven to Sweden. This equipment is made up of units which are themselves complete transmitters, each having a power output of between 500 W and 660 W. Three or four units in parallel have been used to form the 2 kW installation. Probably one of the most appealing features of this equipment is its ability to rectify its own faults. Should a fault develop in any one unit, the transmitter automatically switches itself off, tests itself, locates the fault and switches the sound units on again. This complete cycle is achieved within five seconds.

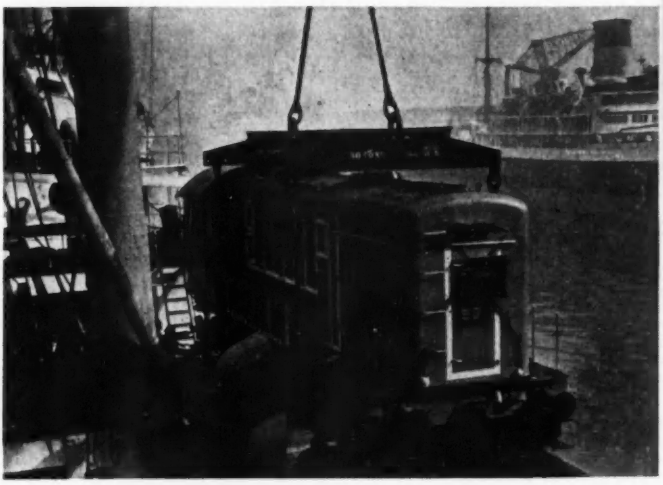
Such an arrangement also facilitates the servicing of one unit while others remain in operation. Another advantage is that many highly skilled engineers may now be released for more important duties, as there is no longer the need for constant attendance on transmitter sites.

Licensing Scheme for Magnesium

A LICENSING system for the distribution of magnesium and its alloys has been announced by the Ministry of Supply and is to come into operation on June 11. This has become necessary because defence needs will account for nearly all supplies of these metals for some time. Among steps to be taken to increase supplies has been the reopening of magnesium plants in this country which were in operation during the war. The first production from these sources will probably be in July. Under the new Order licences will also have to be obtained for treating, using or consuming stocks held on June 11. Consumers are asked to apply immediately for licences to the Ministry, Shell Mex House, Strand, W.C.2.

Home and Overseas Service

FESTIVAL exhibitions supplementing the main South Bank site and Battersea Gardens are opening with almost monotonous regularity. It will



One of eight diesel-electric shunting locomotives built by the N. British Locomotive Co. Ltd., being shipped at Glasgow for transport to Ceylon Government Railways. The loco is powered by a Paxman 12-cylinder Mark 12 Rphkl, Series I, engine driving a G.E.C. combined main and auxiliary generator through a Wellman-Bibby flexible coupling. Automatic control of the engine field in conjunction with the engine governor ensures maintenance of output over a wide range of loads and prevents overloading on any control notch

indeed be a remarkable achievement if visitors to this country manage to see as much as half of these demonstrations of Britain's progress. One of the most recent shows to be opened was the B.B.C.'s contribution to festivities at their Piccadilly studios. This compact review of broadcasting and future potentialities, situated in the heart of London, will not demand a great deal from the Festival visitor's programme, and should not be missed.

Wall displays draw attention to the high spots of our three main programmes, which can be sampled through earphones, as also can any one of nine overseas transmissions heard simultaneously in a space ship which takes visitors into the atmosphere for a view of the universe. Wandering around this exhibition one can see some of the latest recording equipment and a demonstration of cutting sapphires for tipping needles used both for cutting and playing records. Highlight among attractions is the television camera which enables visitors to see themselves on the screen.

Electricity Boards short of Money

DUE to the limited amount of money available for electricity distribution this year, new business which the Southern Electricity Board could undertake would be far below the demands of prospective customers. Thus ran a letter from the Board which was read at a meeting of the area's Consultative Council last week. Despite representations of the Central Authority and the Boards, money seemed unlikely to exceed the level authorised in the year ending last March, although requirements were greater. It was proposed to apportion the total amount as equitably as possible, while giving the Government a clear statement of likely effects. New housing estates and industrial concerns would undoubtedly suffer, the letter stated.

Right of Entry to Empty Meter

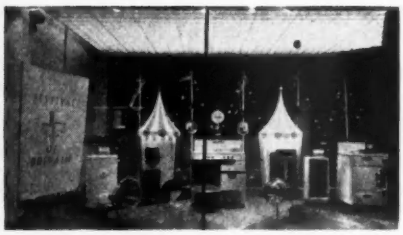
IN an unusual action in the King's Bench Division, judgment was given for the Eastern Gas Board on Monday in a claim for damages for alleged trespass and wrongful entry. For the plaintiff, Mr. C. A. Grove, of Edmonton, it was alleged that the Board's officers, after breaking a window, went into his house and opened the meter, taking out 12s., and later replacing the broken pane. Mr. Grove admitted that he and his family were often away, but said he did not know that officials had called eleven times to empty the meter without getting a reply. He found the replaced window on returning from holiday. The Board admitted the entry, but denied it was wrongful, claiming that the action came within the powers of par. 34 (III) of the Gas Act, 1948. Entry was made by an officer holding a document of authority to enter to inspect the meter and fittings, and clear the coin box. Giving judgment, Mr. Justice Hilbery said evidence established that for 35 years the Board's general manager had exercised the power of forcible entry, believing it legal. It was in the public's interest that Gas Boards should have powers to enable them at reasonable times to get into premises to inspect meters, pipes, etc. Stay of execution was granted pending a possible appeal.

First Regional Conference

THERE was an excellent attendance of members of the Glasgow and Tyneside branches and Edinburgh and Dundee groups at the first regional conference of the Purchasing Officers' Association, which took place in Edinburgh recently. In addition some 20 members of the National Council, in the city for a meeting previously, stayed to join the conference, and during the opening session, "Ask Your Questions," were able to answer queries put by delegates. Two papers were read, and at the closing session members split into two groups to discuss the value of the Association's publications, and the question of material controls and priorities. At the latter meeting delegates criticised the system of allocations based on intake during specific periods. This, they maintained, took no account of stocks used at those times.

Electron Microscopy Conference

SOME 16 papers will be presented at the two-day conference of the Institute of Physics' Electron Microscopy Group's conference, which is to take place at The University, St. Andrews, Fife, on June 19 and 20. The opening session will begin at 9.30 on the Tuesday morning and that day's programme will include a meeting of the Group's committee and the annual meeting of the Group, both of which take place in the evening.



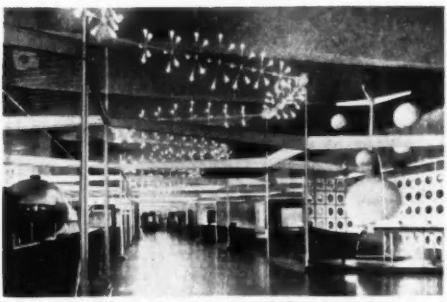
Photographs of two current window displays. (Left) A window in E.E.B.'s service centre at Tottenham, comprises a range of modern fluorescent and tungsten lighting fittings made by Benjamin Electric, and (right) a Festival display in one of Simplex Electric windows

The "Stott" urn installed in one of the non-stop long-distance luxury coaches, providing constant hot water throughout the journey from Scotland to London

Accommodation is being provided for delegates, their wives and guests at St. Salvator's Hall, and will be available from the evening preceding the conference to the Thursday morning, the inclusive charge being £3 5s. Bookings should be made through the Group secretary, Mr. F. W. Cuckow, Chester Beatty Research Institute, Royal Cancer Hospital, London S.W.3.

Atomic Lighting

A DECORATIVE lighting fitting, measuring some 600 ft in length and designed with an atomic age motif, is a remarkable feature of the Festival of Britain Science Exhibition at South Kensington. It is purely decorative and the design has been derived from the atomic structure of carbon, spheres at the junction of sections representing nuclei and the lamps, electrons. The whole fitting consists of 56 sections, varying in length from seven to 17 ft, on each of which several groups of five 25 W lamps have been mounted. Altogether



Lighting with an atomic age motif to be seen at the Exhibition of Science at South Kensington

approximately 1,800 lamps have been employed. Besides providing additional illumination, the scheme also serves as a direction, for by following each section, the visitor has mapped out for him the easiest route through the hall. Mr. Brian Peake, the exhibition architect, was responsible for the design of the system, and the G.E.C. for the manufacture.

Model Engineering

ELECTRICALLY operated models will again be prominent at the Model Engineer Exhibition, to be held at the New Royal Horticultural Hall, Westminster, this year between August 22 and September 1. One of the principal sections in which electricity is expected to play a large part will be that devoted to locomotives. Electrically operated types will be competing with steam and combustion locos, rolling stock and accessories for the championship cup awarded for the best engine shown in the section. In all there are 29 classes of exhibits, in each of which a cup is to be awarded as first prize. Club team cups will also be given to recognised clubs and societies for the best series of three models entered. Entry forms, which must be completed and returned by July 16, are now available from the Exhibition offices at 23 Gt. Queen Street, W.C.2.

Cup of Tea on Non-stop Journey

LUXURY coaches on the Glasgow and Edinburgh to London all-night runs now cover the journey non-stop but with the same amenities. As in air travel, a hostess copes with the necessary refreshments, which previously made for delays *en route*. The provision of cups of tea in a coach, however, has its difficulties, chief among which is an adequate supply of boiling water—a thought-provoking problem when there is a very limited power supply. Stotts of Oldham successfully overcame this quandary with a special contrivance which supplies all the hot water required.

The fixture consists of a heavily insulated urn of four gallons capacity, and has been fitted with a low voltage immersion-type element arranged for operation on d.c. at 24 V. It will be appreciated that the only heating medium available is the low-voltage supply taken from the standard coach wiring circuit. The urn is filled with boiling water at the start of the trip and the battery current is then sufficient to keep the water at the same temperature throughout the journey. Thus, passengers can remain in the coach all night with constant cups of tea and sandwiches to hand—truly a luxury coach.

Dewrance Sales Conference

REPRESENTATIVES of eight countries, excluding the U.K., were present at the 1951 two-day conference of Dewrance and Co., Ltd. held last week. Delegates heard a series of talks dealing with large contracts placed recently with the company, and with the latest technical developments and new products which have emanated from the research departments. Much valuable information was also imported to salesmen and agency executives concerning manufacturing arrangements and licensing agreements abroad. During the second day delegates made an extensive tour of the works, and in the evening, accompanied by their wives, enjoyed a dinner-dance at the Savoy Hotel.

Lansbury Details

ELECTRICAL engineers and contractors visiting the Lansbury housing estate during the Festival of Britain Exhibition of Live Architecture may be interested to learn that in the wiring of the dwellings there, "Nettle" lampholders, combined block and ceiling roses, and combined block and batten holders, have been very extensively used. A general description of the electrical work at Lansbury was given in our issue of April 19.

Excellent Timing and Teamwork

LITTLE Lambs Eat Ivy, Noel Langley's comedy, was this season's choice of British Electricity's Portland Players, last Thursday and Friday. The cast was as follows: Dougall Pitchford, Antony Hemming; Essie, Lady Buckering, Gloria Henshaw; Corder (the Manservant), Ken Wood; Clifford Magill, Ken Wheeler; Bicky, Jean Ward; Pynegar (the Nurse), Reneé Futcher; Gerda Marks, Eileen Wardle; Wilfred Marks, Michael Marcus; Roland Wayne, Anthony Moss; Catherine, Margaret Stratton; Dr. Drew, T. Hedley Mason.

Dealing with a short period in the life of a family of, to put it mildly, markedly eccentric tendencies, this play, with eleven parts more or less evenly matched, depends very largely on timing and teamwork, and all the cast put their backs into it to such good purpose that it is difficult to single out any member for individual praise, although Eileen Wardle gave a moving performance in one of the play's few serious moments. Mrs. E. Manning, the producer, is to be congratulated on the slickness and smoothness upon which the success of this fast-moving play so largely depends.

Shaving through the Ages

FIFTEEN million people shave every day in Britain, removing 60,000 miles of hair from 100 acres of face. These and sundry other facts came to light while a unique collection of shaving implements were being shown by Mr. James H. Rand, president of Remington Rand Inc. in London last week. Over a number of years, Mr. Rand has collected 27 sets of "instruments" ranging from the obsidian stone used in ancient Peru to his company's modern electric razor. It is indeed a unique collection and is to be the subject of a documentary film by Pathe Pictorial. It will eventually be taken to many European capitals for exhibition.

NEWS IN BRIEF

Many electrical engineers, who have passed through Manchester University in the initial stages of their careers, will probably be interested that that seat of learning has completed its centenary.

An indication of the continued development of the Smoke Abatement Society is contained in that body's Year Book for 1951, just published, price 1s. In addition to the Society's annual report and accounts, there are notes on the fuel efficiency activities of the M. of F. and P., and the work of Fuel Research Organisation in the testing of appliances.

Radio, television and electronic equipment, which British manufacturers have done much to develop, has been reviewed in a booklet published by Radio Industry Council. It will be circulated overseas in connection with the Radio Show at Earls Court from August 28 to September 8.

Summer school in programme design for automatic digital computing machines will be held at Cambridge University from September 11 to 21.

Ample evidence of progress, particularly in membership, was given at the annual meeting of the Institute of Physics. Prof. W. E. Curtis was re-elected president for the ensuing year.

An explanation has reached us from one of our correspondents in S. Wales concerning the name of the S. Wales Electricity Board's amateur dramatic society, Star Delta Players (see our issue of March 29). He informs us that it was the original sign and name of the S. Wales Power Company's players, and furthermore that the sign always appeared on S.W.P. equipment.

An order permitting increases in maximum prices of ground sulphur has been made by B.o.T. Operative date is June 1. These increases, of approx. 30% result mainly from the rise in freight rates.

Theme of this exhibit in the Electrical and Radio Exhibition at the Royal Agricultural Society Show, Sydney, Australia, was the link between the B.G.E. and the parent company, G.E.C., England

Electric Supply News

Carmarthen Bay

It was hoped to complete the Carmarthen Bay power station, on schedule, by September 1952, Mr. H. V. Pugh, South Wales Divisional Controller, told the area Consultative Council last week. Completion, though, depended on the progress made on the circulating water pumphouse which would draw about seven million gallons/hour from the sea.

Denbighshire

Referring to objections to overhead supply lines in Denbighshire, Mr. W. Gilchrist, chief commercial officer to the Merseyside and North Wales Electricity Board, has said that if the Board could not proceed with o.h. lines the scheme would have to be put aside on the grounds of economy. He was speaking at the meeting of the Area Consultative Council. Councillor O. Thomas agreed that it had to be recognised that underground cables were not economically possible. There seemed to be people who merely wished to obstruct. The council passed a resolution hoping that the Planning Authority for Denbighshire would realise the necessity for utilising o.h. lines for rural development in the county.

Isle of Gairsay

Work began last week on the laying of a submarine cable to the Isle of Gairsay from the main Isle of Orkney, three-quarters of a mile away. There are only two inhabitants in Gairsay—a Mrs. Coventry and her daughter, who bought the island a few years ago, and who are bearing the cost of the scheme. A private contractor is laying the submarine cable which will be connected by the North of Scotland Hydro-Electric Board to its main supply at Rendall parish.

Lakeland

Due to restrictions on capital expenditure, the North Western Electricity Board has decided not to proceed with a scheme for an o.h. line from Coniston to Grasmere, with a spur along the Langdale valley. For three or four years Lakeland planning authorities have insisted that lines should be placed underground, except in certain places where they would not injure amenities. The Westmorland County Council has now been notified by Mr. J. E. Shepherd, manager for Lakeland Sub-Area of the Board, that even if approval was given of the entire scheme on an overhead basis, restrictions on capital planning would not permit the Board to carry out the work.

North of Scotland

The Secretary of State for Scotland has now made an order confirming the constructional scheme No. 57 of the North of Scotland Hydro-Electric Board. This concerns the Tobermory project.

A confirmatory Order has also been made in respect of Construction Scheme No. 56—the Stornoway generating station project.

Portsmouth

It was hoped to finish the whole of the new extension to Portsmouth generating station by the end of this year, Mr. R. H. Coates, divisional controller, Southern Division, stated recently. If that could be done, it would be quite an exceptional performance, he stressed, for the contracts for the work were only signed on the day before the B.E.A. took over from the corporation.

Wellington (Somerset)

Reversing their previous decision to instal only gas in their new Council houses at Oake, the Wellington Rural District Council have accepted the South Western Electricity Board's line rental proposals, estimated at about £4 to £5 per house with reduction to about £2 where suitable additional apparatus is installed, which they had previously rejected on the grounds of expense and the likelihood of power cuts. The Council will, therefore, be giving their tenants freedom of choice in the type of fuel used for household appliances. Credit is due to Mr. H. D. Weeks, the Board's District Manager, Taunton, for the successful completion of these negotiations.

LIGHTING SCHEMES

Bingley.—Agreement between the U.D.C. and the M.o.T. on the type of lantern and lighting control, is awaited for the new street-lighting scheme from Crossflatts to the Keighley boundary. Park Road, Mornington Road, Chapel Lane and Dubb Lane are to be electrically lit at a total cost of £4,814.

Dunfermline.—The Inspector of Lighting has been instructed to submit a five-year plan for the improvement of street lighting in the Burgh, on the basis of an annual expenditure of £8,000 to £10,000.

Manchester.—The Highways Committee is to spend a further £19,000 on converting main city street lighting from gas to electricity. New lighting in Wythenshawe is to cost £9,900, making a total bill of £28,900 to be approved by the city council.

Middlesbrough.—T.C. has applied for sanction to borrow £1,560 for the erection of 40 electric street lamps on the Saltersgill site.

Ramsgate.—The T.C. has approved a policy for electric street lighting when the lights require renewing and/or new roads are laid out.

Seaham.—The U.D.C. has been asked by the M.o.T. to amend its scheme for street lighting on the Westlea Estate to provide only the minimum amount of lighting at present. The council has pointed out however that the most economical course was to provide an adequate street lighting system during the construction of the estate.

West Hartlepool.—Street lighting in the area bounded by Raby Road, Chetham Road, Chester Road and Jesmond Gardens, is to be converted from gas to electricity, at a cost of approximately £1,000.

Company Activities

Anglo-Portuguese Telephone Co.

Gross receipts for 1950 amounted to £1,301,529, and operating expenses £1,079,946. The net profit is £90,143 (*£61,032*). Final dividend is 5%, making 8%, together with dividend of 8% on "A" Ordinary stock.

Atlas Electric & General Trust

Preliminary statement shows a net revenue after all charges, including taxation, of £261,145 (*£223,217*). The Ordinary dividend is 4% (*3%*). The sum of £1,327 (*£2 922*) is transferred to contingencies reserve and £100,000 (*£50,000*) to general reserve.

British Insulated Callenders Cables Ltd.

The chairman, Sir Alexander Roger, in his statement circulated with the accounts, stresses that the engineering division has had another successful year, one interesting development being the expansion of plant development and construction facilities. The disappointing feature of the year's production has been in l.v. power cables, where the company has been operating considerably below manufacturing capacity. This is due to three causes: cuts in capital expenditure, increased overseas production and, as a result, the fierce competition for available business. It appears that the world productive capacity for l.v. power cables is in excess of requirements. The power cables division has been operating at a high level; the demand for super-tension cable has been maintained and new records of production have been established for S.C. aluminium conductors.

B. S. & W. Whiteley

Group profit for the year to March 31 last is £107,420 (*£69,601*), after charging £113,026 (*£80,688*) to taxation. Transferred to general reserve is £50,000 (*£35,000*), stock reserve £14,000 (*£2,715*). The dividend is increased by 20% to 100%.

Burgess Products Ltd.

Arrangements are being made to market the Preference and Ordinary shares of this company, whose products cover a wide range and include such items as micro-switches, silencing devices, and air filtration plant. The issued capital is £200,000, half of which is in 6% £1 Cumulative Preference and half in 5s. Ordinary shares.

Calcutta Electric Supply Corporation

For 1950 gross revenue amounted to £3,822,416, and expenditure, including depreciation, £2,586,583. The final ordinary dividend is 3% making 6% tax free (*same*). Provision for taxation for initial allowances is replaced by special appropriations. The net revenue account also provides £2,498 (*£120,000*) for taxation, £35,000 (*same*) for retiring gratuity fund, and £16,445 (*nil*) written off cost of debenture issue.

Harland Engineering Co.

Consolidated trading profit for 1950 is £331,421 (*£112,911*), which, with other income, is raised to £341,478 (*£130,073*). To depreciation £30,239 (*£22,535*), and taxation £122,348 (*£33,765*), and the consolidated net profit is £74,267, of which £8,193 is retained by subsidiary companies. There is £2,000 added to provision for deferred repairs, £18,000 to plant replacements, etc., £20,000 to general reserve, and £2,000 to pension reserve. Dividends, including Ordinary of 9%, absorb £20,625, leaving a balance of £31,980 (*£28,531*) carried forward.

Power Securities Corporation Ltd.

Consolidated profit from contracts and other income for 1950 amounted to £440,166 (*£410,513*). After charging depreciation £81,233 (*£100,147*), U.K. taxation £179,886 (*£150,645*), the net profit of the holding company is £141,625 (*£115,643*). Added are tax over-provided or recoverable £1,472, and provisions no longer required £1,577. Provision for additional U.K. taxation on prior year's assessment under appeal £19,150 (*nil*), pension fund £5,650 (*same*), to general reserve £64,335 (*£43,314*), contracts reserve £20,000 (*£55,000*). Ordinary dividend is 6% (*same*), which, with Preference absorbs £44,450, and there is £104,774 (*£113,685*) carried forward.

Siemens Brothers & Co., Ltd.

A bonus of 2½% is added to the usual 7½% Ordinary dividend. The group profit after all charges, including taxation, is £688,841 (*£514,759*). U.K. taxation charged amounts to £497,527 (*£276,895*).

T. Clarke & Co.

Group net profit for 1950 is £8,769, an increase of £1,662 over the previous year's total. This is after charging income tax of £12,905 (*£8,655*) and depreciation £845 (*£850*). The final Ordinary dividend is 9%, less tax (*5%, tax free*), making 18%, less tax (*10%, tax free*). There is a balance of £3,236 (*£448*) carried forward.

Telephone Rentals Ltd.

For 1950, the group revenue amounted to £1,433,978 (*£1,286,309*), less operating costs, etc. £602,360 (*£602,773*), fees, etc. £35,736 (*£31,522*), depreciation £314,947 (*£263,728*), taxation £241,699 (*£177,025*), leaving a group net profit £239,236 (*£211,261*).

Dividends Declared

Brecknell, Munro and Rogers. Interim dividend of 10% (*same*).

Crompton Parkinson, Ltd. Interim Ordinary dividend of 3¾% (*same*).

Engineering and Lighting Equipment Co. Ordinary dividend of 5% (*nil*), and 31½% representing 4½ years' dividend on 7% Preference. Net profit is £31,575 (*£16,477*).

Holophane Ltd. Interim dividend of 7½% (*same*).

Ship Carbon of Gt. Britain. Dividend of 25% (*15%*). Net profit £96,506 (*£96,653*).

Commercial Information

CONTRACTS OPEN

HOME

June 2.—Haslington T.C. Electrical work in erection of 4 houses and 20 flats in Church St., and a block of 8 flats in Bury Rd. James Mason, Borough Engineer and Surveyor, Municipal Offices. Deposit £2 2s.

June 2.—Cambridge. Supply of equipment for conversion from gas to 140W sodium lamps, 406 of each of following : lamps and lanterns, auto transformers, capacitors, control boxes, arm brackets. Application by above date to City Engineer and Surveyor, T.V. Burrows, The Guildhall. Deposit £2 2s.

June 4.—Carluke. Electrical work in block of houses at Law Hospital. Documents from Henry K. Mitchell, secretary, Law Hospital, Carluke.

June 4. — Dorking (Surrey) R.D.C. Electrical work to 3 arches under Station Approach, Horley. Surveyor, Russeldene Church Rd., Horley.

June 4.—Durham. Supply of sundry laboratory and workshop machinery and equipment for Stockton-on-Tees technical college, including electrical engineering motors, generators, transformers and instruments, electricians' tools and equipment. Applications to A. A. Denholm, Director of Education, Shire Hall, Durham.

June 4.—Irvine T.C. Supply of equipment for installation of sodium street lighting along trunk road A78. Burgh Surveyor, "Heathfield," Kilwinning Road, Irvine.

June 6.—Elgin. Electrical work in erection of fire station at Friars Rd. John Findlay, county architect, County Buildings, Elgin.

June 7.—N. Ireland. Electric van, refrigerator and portable X-ray unit required by S. Belfast Hospital Management Committee for Belfast City Hospital. Documents from Supplies Officer.

June 9.—Clyde. Supply of electric lamps and cables and welding electrodes for stores for 12 months beginning July 1. Stores Superintendent, No. 1 Graving Dock, Glasgow C.1.

June 9.—Swansea T.C. Electrical installation in children's home. Applications by above date to Borough Architect, Guildhall. Deposit £2 2s.

June 9.—Leeds. Manufacture supply and erection of following equipment for pumping station at Knostrop sewage works: one 6·6 kV, 400 A, 150 MVA switchboard; one 2 kV, 400 A, 50 MVA switchboard; one ·415/·346 kV, 2,000 A, 25 MVA switchboard; two 1,000 kVA, 6·6/2·0 kV transformers and two 500 kVA 6·6/·415/·346 kVA transformers. Sewerage Engineer's Office, Civic Hall, Leeds 1. Deposit £5.

June 11.—Rossclare. Electrical alterations at Killadeas Hospital for N. Ireland Tuberculosis Authority. Applications to W. Harvey, secretary, 27 Adelaide St., Belfast. Deposit £3 3s.

June 11.—West Hartlepool T.C. Electrical installation in residential nursery at Hollymount, Wooler Road. Borough Architect, Municipal Buildings.

June 11.—Worthing T.C. Rewiring of electric circuits in approximately 130 houses on S. Farm estate. Borough Engineer and Surveyor, Town Hall. Deposit £3 3s.

June 13.—Liverpool. Instruments for electrical engineering laboratory and workshop at Riversdale Technical College. Director of Education, 14 St. Thomas St., Liverpool 1.

June 13.—Milnrow U.D.C. Electrical work, wiring, etc., for 50 flats now being built at Firgrove. Council's Surveyor, Council Offices, Milnrow, Lancs.

June 15.—Oswestry T.C. Provision, erection and wiring of 29 concrete columns, 12 varied brackets and one central suspension fitting, with 42 lanterns and H.P.M.V. lamp, gear, time-switches, etc., on Swansea-Manchester trunk road, Borough Surveyor, Guildhall. (See May 17 issue.)

June 16.—Enfield U.D.C. Provision and laying of cables, service switchgear and switching pillars and connection to 128 lamp columns along about 3 miles of Gt. Cambridge Rd. Applications by above date to Engineer and Surveyor, Frank Lee, 7 Little Park Gardens, Enfield. Deposit £2 2s. (Advertised in this issue.)

June 16.—N. Ireland. Electrical installation to surgeons' residence at Tyrone Co. Hospital. D. B. T. Scott, Secretary, W. Tyrone Hospital Management Committee.

June 16.—St. Neots U.D.C. Supply and erection of 26 concrete columns, one wall-mounting bracket, 27 lanterns with 140 W sodium lamps, auxiliary equipment and wiring for street lighting on Ipswich-Weedon trunk road A45. L. Henderson, clerk of the council, Council Offices, Huntingdon St., St. Neots, Hunts. Deposit £2 2s. (See May 10 issue.)

June 18.—Fleet (Hants) U.D.C. Supply of two sets of electrically driven vertical pumps with ancillary equipment, capable of pumping 300 g.p.m. Engineers, John Taylor and Sons, Artillery House, Westminster, S.W.1. Deposit £5.

June 18.—Swinton and Pendlebury T.C. Rewiring for light and power installation, and supply of fittings, at Victoria House, Victoria Park, Swinton. Borough Engineer and Surveyor, Town Hall. (See May 24 issue.)

June 19.—Halifax T.C. Re-electrification of Sunnyside secondary and primary schools. Borough Engineer, Crossley St. Deposit £1 1s. (See May 24 issue.)

June 22.—Belfast. Supply and erection of a 75-ton overhead electric travelling crane for turbine house; two coal unloading cranes each of 150 tons per hour capacity; boiler feed pumps (4 motor driven and 1 steam turbine driven) to deliver 320,000 lb. p.h.; and band type circulating water screening plant for approx. 4 millions g.p.h. All for Victoria power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. in respect of each specification. (Advertised in this issue.)

June 25.—Clitheroe R.D.C. Provision and erection of pumping plant comprising two electric motors and pumps with automatic remote control, capable of 10,000 g.p.h. Consulting engineer, Arnold Brooksbank, The Exchange, Bradford. Deposit £2 2s.

June 26.—Enniskillen T.C. Installation of fluorescent concealed lighting in assembly hall of Town Hall. Borough Surveyor's Office, Town Hall.

June 26.—Galway. Electrical installation in new regional general hospital at Galway. Work covers mains and switchgear, lighting, service plugs, etc. Consulting engineers, J. A. Kenny and Partners, 44 Kildare St., Dublin C.17. Deposit £26 5s.

Sept. 3.—Dublin. Electricity Supply Board invites tenders for supply, delivery and erection of one 30 MW steam driven turbo-alternator set with condensing plant, feed heating plant and auxiliaries at Ringsend power station. Generation Engineer, 27 Lower Fitzwilliam St., Dublin. Deposit £5 5s. (See May 24 issue.)

No date stated.—Bristol. Stapleton Hospital Management Committee invites tenders for supply of electric lamps and sundry electrical materials for year ending March 31, 1952. Applications to be placed on list of suppliers should be submitted to D. Pearson, secretary of Committee, 200 Manor Rd., Fishponds, Bristol.

No date stated.—Fort William. Electrical installation in erection of six blocks (total of 26) houses on Claggan site. John A. W. Grant, chartered architects, 36 Melville St., Edinburgh.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

July 4.—Queensland State Electricity Board invites tenders for instrument transformers and instruments. B.o.T. (Ref. CRE (IB) 61430/51).*

July 11.—Egypt. Supply and installation of a diesel alternator generating set with accessories and control gear, kerosene air compressor set, pumping set electric motors, for Luxor Municipal Electric power station. Egyptian Ministry of Municipal and Rural Affairs. B.o.T. (Ref. CRE (IB) 61561/51).*

June 12.—Wellington (N.Z.). Supply of 600 yd of white cotton sleeving, 20,000 yd Egyptian cotton tape, 50 rolls of electrical adhesive tape, and 14 lb of round copper wire. Director-General (Stores Div.), G.P.O., Wellington C.1. B.o.T. (Ref. CRE (IB) 61747/51).*

June 13.—Greece. Ten electrically driven luggage carts, fixed floor, load capacity 1½ tons with trailers, required by Procurement Committee for Reconstruction Materials (Railways), Ministry of Communications, Sofokleons Str. No. 7, Athens. Also four rectifiers for a.c. three-phase, 220 V, 50 c/s, and spares and accessories.

June 21.—Greece. Ministry of Communications, General Direction of Railways, Sofokleons Str., requires telephone materials and loudspeaker assemblies. B.o.T. (Ref. CRE (IB) 61908/51).*

June 21.—Tangier. Telephone Co. for supply of lead-covered cables containing copper conductors of 6/10 millimetres section and paper insulation, and same containing enamelled copper conductors of 5/10 millimetres section and textile insulation. B.o.T. (Ref.: CRE (IB) 60972/51).*

June 25.—India. Stores Purchase Committee, Govt. of Mysore invite tenders for a 1,500 kVA outdoor unit substation with accessories. B.o.T. (Ref. CRE (IB) 61857/51).*

July 27.—S. Africa. Town Council of Springs, Transvaal, invite tenders for supply of seven 5,000 kVA super tension transformers with one earthing accessory plant. Documents from J. S. Clinton, P.O. Box 4648, Johannesburg. Deposit £3 3s.

CONTRACTS PLACED

Battersea. Electrical installation at Rollo St. housing scheme, Holliday, Hall and Stinson, £7,589.

Durham. Electrical installation at Stockton new technical college, Watson-Norie Ltd., £13,640; also same at Newton Aycliffe county school, W. Sykes and Son, £2,284.

Frome (Somerset) U.D.C. Installation of fluorescent and sodium lighting in main streets, Southern Electricity Board, £5,858.

Grimsby T.C. Electrical installation at Highfield grammar school, N. G. Bailey and Co., Ltd., £12,162.

Your Queries — Answered

"Biobar" soldering irons, makers of? L.B.—Bio Electrics Ltd., 22 Pitt St., Glasgow C.2. (20339)

"Columbine" irons, makers of? W.E.—C.V.A. Jigs, Moulds and Tools, Ltd., 7 Buckingham Rd., Brighton 7. (20346)

"Keith" toaster elements, suppliers of? S.B.—Roevac Metal Pressings, Ltd., 329 and 366 Stretford Rd., Hulme, Manchester 15, who took over the "Keith Toastmatic" toaster from Keith Electrical Industries, Ltd., Thorburn St., Upper Brook St., Manchester 13. (20358)

"Cooper" waffle iron, service for? S.B.—A. G. Field and Co., Ltd., 10 Devonshire Row, E.C.2. (20367)

"Hesco" blankets, makers of? N.E.—Holt Engineering and Mfg. Co., Ltd., 290 Stockport Rd., Manchester 13. (20382)

"Itonia" irons, makers of? E.S.—Itonia Co., Ltd., 3 Leeds Place, N.4, a firm which went out of business about a year ago. We have been informed that Mr. H. Chapman, 71 Golworth Rd., Woking, Surrey, can undertake repairs. (20376)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

Vacuum cleaner marketed by the Silent Electric Manufacturing Co.—address for spares? S.B.

L.C.C. Electrical installation in dwellings on Tabard Garden estate, Southwark, Haines and Sheppard Ltd., £3,369; also same on Hedgeman's Rd. site, Becontree, Rylands Electrical Co., Ltd., £1,661.

Leicester. Internal telephone installation at The Towers for Sheffield Hospital Board, Communication Systems Ltd., £4,271.

Sheffield. Electrical installation in 104 houses at Littledale, A. Holmes, £2,203; in 182 houses and 32 flats at Manor Park, and 22 at Woodthorpe and Basegreen, Hobson and Scott Ltd., £4,737. Also renewal of electric cables at Lodge Moor Hospital for Regional Board, Yorkshire Electricity Board, £2,387.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Bartlett. 678,084. Class 7. Potato peeling and slicing machines; bread cutting machines; butter pat making machines; mincing machines for food, etc. 678,085. Class 9. Coffee percolators and pots, kettles, urns, boiling pans and saucepans, all being electrical goods. G. F. E. Bartlett and Son, Ltd., 30/34 Bell St., N.W.1.

Combimet. 695,175. Class 9. Electrical contacts and electrodes for electric welding. Metro-Cutanit Ltd., 160 Piccadilly, W.1.

Cyldol. 693,878. Class 17. Insulating oils and varnish. H. G. Allcord and Co., Ltd., Cyldol Oil Works, Altrincham Rd., Wythenshawe, Manchester.

Permag. 697,004. Class 7. Apparatus incorporating permanent magnets for separating materials, etc. Permag Equipment Ltd., 71 Edmund St., Birmingham 3.

Stabilec. 694,915. Class 11. Electrically heated laboratory ovens. Baird and Tatlock (London) Ltd., 14/17 St. Cross St., E.C.1.

Sunvac. 697,518. Class 7. Pumps and condensers. Sunvic Controls Ltd., 10 Essex St., Strand, W.C.2.

Unistor. 697,646. Class 9. Asymmetric electrical resistors. Standard Telephones and Cables Ltd., 63 Aldwych, W.C.2.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	234 0 0	£220 0 0
LEAD, good soft pig (foreign)	160 0 0	136 0 0
,, ,, ,, "English" quality ...	161 10 0	
TIN (99-99.75%) ... ...(Cash)	1120 -1130	—
,, (3 months)	1107½-1110	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	160 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	47 10 0	—
Mild Steel Tape (0·04 in.)	26 10 0	—

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Glyn Radio and Electrical Co. Ltd., 188 Glyn Rd., Clapton, E.5. Cap.: £1,000. Dir.: A. J. Heester.

Electrical Services (Fareham) Ltd., The Gillies, West St., Fareham. Cap.: £3,000. Dirs.: P. J. Hayward, R. F. Bradbeer and G. M. Bayly.

T.V. Servicing (High Wycombe) Ltd., 23 Crendon St., High Wycombe. Manufacturers of and dealers in wireless and television sets, etc. Cap.: £1,000. Dirs.: J. James and F. Farley.

T.V. Servicing (Midlands) Ltd., 30 Stone St., Dudley. Manufacturers of and dealers in wireless and television sets etc. Cap.: £1,000. Dirs.: J. James, K. Longstreet and A. F. Roberts.

G. Lawson Ltd., 7 Tyne St., Newcastle-on-Tyne 1. To take over business of welders carried on at Newcastle-on-Tyne as "Tyne Electric Welding Company." Cap.: £2,000. Dirs.: G. Lawson and Mrs. M. Lawson.

Aeronautical Electronic and Engineering Co. Ltd., Sunleigh Works, Sunleigh Rd., Alperton, Mdx. Cap.: £1,000. Dirs.: Mrs. M. F. H. Wells and S. G. J. Hart.

Airecomponents Ltd., Oxford Bldg., Oxford Row, Leeds 2. Mechanical, electrical, constructional and general engineers, etc. Cap.: £1,000. Dir.: H. G. Parkinson.

R. H. Wilson and Sons Ltd., Galley Hill Works, London Rd., Swanscombe, near Greenhithe, Kent. Woodworkers, radio, television and other cabinet makers, etc. Cap.: £3,000. Dirs.: R. H. S. Wilson, L. R. Wilson, G. H. Wilson.

TRADE NOTES

Holidays. Standard Telephones and Cables Ltd. advise us that their Newport Cable Works at Corporation Road, Newport, Mon., will be closed for the annual holiday from July 30 until August 14.

N.Z. Imports. Included in a list of goods freed from the requirement of an import licence if imported into New Zealand from soft currency areas, are ceiling roses and appliance plugs, and electric toasters embodying an automatic ejector.

Changes of Address. W. B. Dick and Co. Ltd. have moved to 43 Grosvenor Street, London W.1. Tel.: Grosvenor 6050.

Down and Nicholson Ltd., engineers, have moved to 10 Wellington Place, Aberdeen. The telephone number remains —Aberdeen 27435.

Egypt. Among items now exempted from Customs duties are: electric generators, motors and transformers, electro-technical equipment, apparatus for the application of electricity in general, superheaters, and feed-water heaters.

Copper Price Up. An increase of £24 a ton in the price of electrolytic copper, from £210 to £234, as from May 25, has been announced by the Ministry of Supply. Discounts and the forward purchasing arrangements are unchanged.

Distributors. A.C.E.C. has appointed Land Speight and Co. Ltd., 73 Robertson Street, Glasgow C.2, as exclusive distributors in Scotland for their "Dictorel" dictating machines.

BUSINESS PROSPECTS

HOME

Aylesbury T.C. Erection of 32 flats on estate at Southport. Architect is Raymond C. White, 4 Temple Square.

Banbury. O. H. Nuttall, 46a High St., have been appointed architects for erection of 10 houses at Adderbury West and 8 at Horley and E. H. Earp and Badger, Scholar Lane, Stratford-on-Avon, for erection of 12 at Hook Norton, 14 at Bloxham, and 8 at Milton.

Barnsley. Erection of new junior girls school at Athersley. Architects, Dyson, Cawthorne and Coles, 25 Regent Street.

Beverley R.D.C. Construction of 12 houses at N. Ferriby, 8 at Little Weighton, 6 at Kilnwick and 4 at Lockington. G. Palfreyman, engineer, surveyor and architect, 36 Market Place. Also erection of county secondary school has been included in this year's building programme.

Billingham-on-Tees. I.C.I. Ltd., is to build offices in Chiltons Lane. It is also proposed to erect laboratories in Central Ave., and to extend the Clarence Distillation Works.

Bletchley (Bucks). Estimated cost of adaptations and extensions at Bletchley Park Training College, is £23,000.

Boston T.C. Erection of 48 houses on Carlton Road site. Borough Surveyor, Municipal Buildings.

Buckinghamshire. Construction of junior school Burnham Priory estate, Slough. Applications to County Architect, County Offices, Aylesbury.

Carlisle. Tenders expected to be invited shortly for £30,000 scheme comprising new workshops and hostel for blind at Petteril Bank. Architect is Ralph Wright, 13 Castle Street.

Cookstown (Tyrone). Council received licence to build a town hall.

Darton U.D.C. Erection of 50 houses on Staincross Common site. S. Wilson, Housing Officer, Council Offices, Darton, near Barnsley.

Derby T.C. Primary schools to be built on Mackworth estate. Applications to Borough Architect, the Council House, Corporation St.

Dover T.C. Construction of 32 houses on Buckland Valley estate. Borough Engineer, Brook House, Dover.

Down. Erection of county primary school at Bangor. Quantity Surveyors, McCarthy and Lilburn, 47 Scottish Provident Buildings, Belfast.

Downham (Norfolk) R.D.C. Construction of 10 houses each at Denver, Feltwell and Methwold. Hughes and Bicknell, 1 Tunwell's Court, Trumpington St., Cambridge.

Durham. Application made for sanction to borrow £135,000 for hostels at Winlaton, Stanley, Durham and Jarrow. Plans approved for 50 houses at Wilton Gilbert and further 30 houses are to be built at Framwellgate Moor. Plans approved for establishment of county primary schools at Peterlee and and Stainton Military Camp. County Architect is G. R. Clayton, Court Lane.

Easingwold (York) R.D.C. Erection of 30 houses and 8 bungalows on Galtres estate, in Easingwold Rd., and at Tholthorpe. Housing Surveyor, Council Offices, Croft House.

Gateshead. Work is expected to start this year on new secondary school in Dryden Road. Borough's Chief Architect is H. J. Cooke.

Gosforth (Northumberland) U.D.C. Council to build 6 houses in Hutton Street, and 16 flats and 2 houses in Haddricksmill Road.

Great Yarmouth T.C. Erection of 140 houses on the Magdalen College estate. Borough Engineer, Town Hall.

Glendale (Northumberland) R.D.C. Contract shortly to be let for erection of 70 houses on High Fair site. Plans prepared by Reavell and Cahill, Lloyds Bank Chambers, Alnwick.

Gravesend T.C. Erection of 53 flats in five blocks in Valley Drive, being first part of a total of 122 flats. Borough Engineer and Surveyor, 6 Woodville Terrace, Gravesend.

Halifax T.C. Erection of Stanningley Green county primary junior school. Applications to Borough Engineer, Crossley Street.

Hartlepool. Dock improvement scheme to be carried out by the Docks and Inland Waterways Executive at cost of £330,000 will include installation of electric cranes.

Hebburn-on-Tyne U.D.C. Plans approved for erection of 11 bungalows and 6 houses on Buchanan Street site. R. C. Bestow is surveyor.

Hertfordshire. C.C. is seeking approval for building junior mixed and infants schools in Theobald St., this year, and the same at Boreham Wood during 1952.

Leeds. Erection of a children's home at Moortown East estate. City Architect, Priestley Hse., Quarry Hill, Leeds 9.

Lincolnshire. A £30,000 hostel for old people is to be built at Cleethorpes.

Lindley. Tenders to be invited during the next six weeks for construction of 4 laboratory and workshop blocks, canteens, library, etc., at estimated cost of £150,000.

Lindsey (Lincs). Erection of junior school near Lacey Gardens, Louth. Denis Clarke Hall, architect, 6 Mason's Yard, Duke St., St. James's, London, S.W.1.

Liverpool. Construction of 320 dwellings on Croxteth estate, 180 on Speke estate and 78 flats in Queensland St. City Architect and Director of Housing, Blackburn Chambers, Dale St., Kingsway, Liverpool 2.

Nuneaton. Plans being prepared for construction of research laboratories costing in the region of £125,000 at Lindley for Motor Industry Research Assoc. Architects are Clifford, Tee and Gale, Moorgate Hall, 153 Moorgate, E.C.2.

Paddington. Applications invited for inclusion on lists of prospective contractors, for erection of multi-storey flats, comprising some 386 dwellings, on Hallfield estate. W. H. Bentley, Town Clerk, Town Hall, W.2.

Plymouth. B. Pooley and Sons Ltd., propose to build a factory in Regent Street.

Reading T.C. Erection of 186 houses on Bath Rd. estate. Borough Architect, Town Hall.

Skipton U.D.C. Erection of 50 houses on Horse Close estate. K. B. Robinson, Engineer and Surveyor, Town Hall.

Stratford-on-Avon. Council to invite tenders shortly for erection of 24 houses at Henley-in-Arden.

Wirral (Cheshire). Cadbury Bros., are to build a factory at Moreton.

(Continued overleaf)

OVERSEAS

Pakistan. The Rawalpindi Electric Power Co., Ltd., Electricity Bldgs., Mayo Rd., Rawalpindi, is anxious to obtain supplies of table lamps similar to those produced in Germany and Czechoslovakia pre-war. Company's commercial manager is R. G. Hellaby.

Portugal. Ministry of Colonies, Lisbon, is expected to invite tenders shortly for radio communication equipment, navigational radio aids and equipment for lighting landing strips to be installed on five airports in Mozambique, Angola and Guinea.

S. Africa. Morris Katz, 2 Gold St., City and Suburban, Johannesburg, seeks direct purchase quotations for a.c. motors of up to 150 h.p.

Also direct purchase quotations are being sought for domestic electrical appliances (refrigerators, etc.) by I. Abrahamson (Pty) Ltd., 141 Main St., Johannesburg.

Syria. Abdelnour Freres, P.O. Box 300, Aleppo, seeks agency for 20 units of air-conditioning equipment, 400 units p.a. portable radio receiving sets, 100 units p.a. car radios, 150 units p.a. electric fans.

U.S.A. Wimberley and Thomas Hardware Co., Inc., 1809 First Avenue South, Birmingham, Alabama, want quotations for self-sealing tape for industrial purposes. Offers should be marked for attention of Mr. W. C. Lanham.

MEETINGS TO NOTE

THURSDAY, MAY 31

ASSOC. OF MINING, ELECTRICAL AND MECHANICAL ENGRS. (S. Wales branch).—Fortieth annual meeting to be held at Inst. of Engrs., Park Place, Cardiff, 6 p.m.

MONDAY, JUNE 4

JOINT ENGINEERING CONFERENCE.—Organised by I.E.E., Instn. of Mechanical Engrs. and Instn. of Civil Engrs. Conference to be held in London and continues until June 15.

A.S.E.E. (Bournemouth branch).—Visit to Poole power station.

WEDNESDAY, JUNE 6

N.W. FUEL LUNCHEON CLUB.—"What are we Waiting For?" H. Wright Baker. Engineers' Club, Albert Sq., Manchester.

SATURDAY, JUNE 9

I.E.E. (S.W. Sub-centre).—Summer meeting in N. Devon. Tanton's Hotel, Bideford, 12 noon.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Riley Clock and Instruments Co., Ltd. Meeting of members will be held at 155 Charing Cross Rd., W.C.2, on June 6 at 11 a.m., to receive liquidator's report.

Electrical Services (Cowley) Ltd., Oxford. At meeting of creditors statement of affairs showed liabilities of £3,215. Assets were estimated to produce £2,531, and after allowing £216 for preferential claims, net assets amounted to £2,314, or deficiency as regarded creditors of £901. So far as contributories were concerned, there was total deficiency of £2,401. Resolution passed confirming voluntary liquidation, with R. F. Bendall, C.A., of Messrs. Poppleton and Appleby, Birmingham, as liquidator, with a committee of inspection. Creditors should send particulars to liquidator by June 30.

Cawnpore Electric Supply Corporation Ltd. Creditors are asked to send particulars to A. L. B. Tucker and D. C. Wilson, Orient House, New Broad St., E.C.2, joint liquidators, by June 30.

Auto-Cold Refrigeration, Ltd., of Norbury, S.W.16, refrigerator dealers. First meeting of creditors was held on May 22 when accounts prepared showed that company traded at a profit until March 31, 1949, when a net loss of £268 was incurred. In following year (the last year covered by accounts) there was further net loss of £771. No statement of affairs had been filed but on present information gross liabilities had been returned at £7,406, which included the debenture holders' claim for £3,600 and preferential claims of £366: the balance of £3,364 was said to be due to unsecured creditors. Assets were valued at £2,405. Resolution passed for appointment of Mr. C. H. Barclay, C.A., 5 Giltspur Street, E.C., as liquidator, with committee of inspection.

Redgrave Engineering Co., Ltd., electrical engineers, Bognor Regis. An approximate statement of affairs was submitted at meeting of creditors which showed liabilities of £3,714, of which £2,950 was due to trade creditors. Assets were put down at £1,989 and after allowing £140 for preferential claims, there were net assets of £1,849, or a deficiency as regarded creditors of £1,865. So far as shareholders were concerned, there was a total deficiency of £6,815. Resolution passed confirming voluntary liquidation, with Mr. J. S. Bradley-Hole, of Messrs. A. F. Orbell and Co., 6 and 7 Old Steine, Brighton, as liquidator. Committee of inspection was also appointed.

Madras Electric Supply Corporation Ltd. Creditors are required to send particulars to liquidators, David Evan Webb and Clifford R. Akers, 1 Queen Victoria St., E.C.4., by June 14.

BANKRUPTCY ACTS

First Meeting

West Bromwich. William W. Brown, trading as "Lombard Electrical Wholesale Supplies" at 64 Dagger Lane, West Bromwich. First meeting at Somerset House, 37 Temple St., Birmingham 2, on June 5 at 11.15 a.m., and public examination at Law Courts, Lombard St. West, West Bromwich, on July 11 at 11 a.m. Date of receiving order, May 16.

Receiving Orders

Blackburn. Stafford Green, electrical contractor of 373 Bolton Rd., Darwen. Date of receiving order, May 21.

Chelmsford. Bertie Alfred Murton, electrician trading at 54 The Green, Writtle. Date of order was May 22.

Dividends

Stafford. Sydney W. Morley, radio and electrical engineer, trading as "Morleys" at Bow St., Rugeley. First and final dividends of 2s. 4½d. in £ payable at 17 Albion St., Hanley, Stoke-on-Trent, on June 8.

Interded Dividends

Torquay. Arthur F. Pencock, radio engineer of 15 Bank St., Teignmouth. Last day for receiving proofs, June 10. Trustee is L. E. Ingram, Official Receiver, 26 Baldwin St., Bristol 1.

Newcastle-on-Tyne. Samuel Irvine Rae, electrical contractor, trading as "S. I. Rae" at 1 Ashburton Rd., Gosforth. Last day for receiving proofs, June 8. Trustee is Gordon Barr, Conyers Chambers, 135 Sandyford Rd., Newcastle.

Revocation of Adjustment Order

Mansfield. Howard Chas. Jones, electrical engineer, now trading at Spencer St., Mansfield. Date of adjustment order, Sept. 18, 1944, and date of revocation, April 30, 1951.

AUTOMATIC TELEPHONE AND ELECTRIC CO.

High Level of Output

THE annual general meeting of the Automatic Telephone and Electric Company Limited, will be held at Liverpool on June 13.

The following is an extract from the circulated Statement of the Chairman, Sir Alexander Roger, K.C.I.E.:—

The Group consolidated profit amounts to £1,526,689 and after charging taxation of £812,421 there is left £714,268 for the many purposes to which this could most profitably be applied. For the past twelve years the dividend on the Ordinary and Deferred stocks has remained unchanged at 12½% (10% plus 2½% bonus). The Directors feel that the time is now appropriate for a modest increase and they recommend the payment in respect of 1950 of a final dividend of 12% on the Ordinary stock, making with the interim dividend of 3% already paid, a total of 15% for the year, and a dividend of 15% on the Deferred stocks.

Although a high level of output has been maintained, it was not sufficient to absorb the full productive capacity of our factories. This was mainly due to a temporary recession in exports and reduced British Post Office orders for telephone plant and equipment. During the latter half of the year production was threatened by the growing shortage of raw materials. We hope to pull through but it remains a charge against the Government that they failed to maintain proper stocks whilst preventing industry from looking after themselves. When stock-piling began in the United States, I suggest that if the Government had taken similar steps nationally, we in this country would be in a better position. The ponderous machine of Government, hampered as it is with Socialist theory, is no match for private enterprise when prompt and far-seeing action becomes necessary.

In this Company we are hopeful that because of the low ratio of pounds-weight of material to pounds sterling of output, we may be able to maintain our full volume of business.

Subsidiary Companies

Communication Systems Ltd. again had a satisfactory year. Both sales and the number of its rental contracts for Private Automatic and Intercommunication telephones and Public Address systems were higher than last year. Hivac Ltd. had a successful year, and its output of subminiature valves, telephone switchboard lamps and electronic devices reached a new record. Our Overseas Sales companies in Australia, New Zealand and South Africa continue to show satisfactory results. In South America our subsidiary interests are ably fulfilling their missions in engineering liaison work to customers. Our Indian Company is now engaged on the installation of equipment for the Calcutta Telephone automatisation programme. In Portugal our manufacturing subsidiary continues to develop.

An increasing demand for our radio, telegraphy and carrier telephony products has been supported by an expansion of the development work carried out by the laboratories of British Telecommunications Research Ltd. at Taplow.

Provided no major crisis besets us, we can look forward with some confidence to the results of the current year.

BRITISH INSULATED CALLENDER'S CABLES

Year of Great Contrast

THE 6th annual general meeting of British Insulated Callender's Cables Ltd. will be held on June 14, at Liverpool.

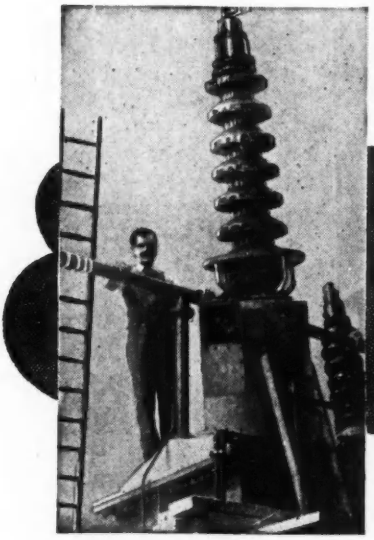
The following is an extract from the statement circulated by the Chairman, Sir Alexander Roger, K.C.I.E.:—

1950 was a year of great contrast. Last June the immediate outlook was not so assured as it had been a year previously, mainly due to the cuts imposed by our Government on the capital expenditure of our principal customer groups in this country, and to the increasing, and in some cases fierce, international competition being experienced in certain overseas territories. These factors seriously affected certain of our activities during the first half of the year, but for the remainder of 1950, our production facilities in practically all Divisions were stretched almost to the limit. The net result is that profit on trading fell by £255,250 although it still reached the satisfactory figure of £3,233,039.

The experience of several of the units in the Group has been similar to that of the Parent Company, but in others operating in different fields a consistently high level of activity was maintained throughout the year and a further improvement was shown on the 1949 results. In total, however, Group profit on trading has fallen by £607,622 to £6,130,642. In spite of this, due to higher rates, taxation absorbs the wholly disproportionate and crippling figure of £2,945,201. It is clear beyond any doubt that the present crippling burden of taxation cannot be continued if industry in this country is to remain competitive in the world markets. There are able men in other countries planning and working all the time to improve their productivity and efficiency and they are not being penalised for doing so to anything like the extent we are by taxation or rules and regulations. Since the amalgamation in the Parent Company we have had to pay or reserve out of profits no less than £9 million for taxation.

The Outlook

Sales for the early part of 1951 reached an exceptionally high level, but this involved drawing on the stocks of copper and certain other raw materials in our pipe-lines to execute orders accepted prior to any rationing. Subsequently, the full effect of the rationing of copper and the shortage of other materials has been increasingly felt, and our sales now, and as far as can at present be seen ahead, must of necessity be geared to the materials made available to us for production purposes. Any further deterioration in supplies will bring about a serious position. Any improvement would ensure us of a steady load factor for some time ahead.



"When I came to these Works,

. . . I thought Hackbridge were fussy over small things. Everything had to be just so, or it wasn't good enough. Now I've been here for a good many years I realise that this must be one of the reasons for the good name of Hackbridge transformers. They're good looking, workmanlike jobs; and they have to be right from start to finish!"

HACKBRIDGE
TRANSFORMERS

All Types-Sizes-and Voltages

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

MORE POWER

. . . . . means prosperity

Today the prosperity of any country is directly dependent on the amount of electrical power available. The M-V organization by supplying steam, hydro-electric and gas-turbine power plant for power stations at home and abroad is making an important contribution to world prosperity.

The above photograph shows the Pitlochry station on the Tummel-Garry scheme of the North of Scotland Hydro-electric Board, containing two Metrovick 8,333 kVA generators. Other M-V equipment including switchgear and transformers, is assisting the latest industrial developments in Scotland.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., MANCHESTER, 17
Member of the A.E.I. group of companies

METROVICK *electrical equipment for hydro-electric schemes*

C/W101

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED • FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

PUBLIC NOTICES

CAROLINE HASLETT TRUST

THE Trust invite applications for the award of a travelling exhibition tenable in Switzerland in the early autumn of 1951.

The award will entitle the holder to study, for a period of two months, some aspect of domestic electrification in that country.

As there are still restrictions on sterling exports the exhibition will be limited to cover moderate expenditure on travelling and maintenance.

Applicants must hold the Diploma in Electrical Housecraft awarded by the Electrical Association for Women; a knowledge of French and of German is desirable.

Application forms, which must be returned before June 30, 1951, may be obtained from: The Caroline Haslett Trust, 35 Grosvenor Place, London S.W.1. (K 869)

TENDERS INVITED

URBAN DISTRICT COUNCIL OF ENFIELD

LIGHTING—GREAT CAMBRIDGE ROAD

CONTRACTORS desirous of tendering for the provision and laying of electric cables and services, switchgear and switching pillars and for connection to 128 No. lamp columns along approximately three miles of the Great Cambridge Road (trunk road) within the Urban District should apply to the Engineer and Surveyor, Mr. Frank Lee, A.M.I.C.E., F.R.I.C.S., 7 Little Park Gardens, Enfield, before June 16, 1951. Tender documents will be forwarded after that date.

All applications must be accompanied by a deposit of £2 2s., to be returned on receipt of a bona-fide tender addressed to the undersigned and/or the return of all documents.

Plans and conditions of contract may be inspected at the offices of the Engineer and Surveyor as aforesaid after the despatch of the tender documents, on Mondays to Fridays between the hours of 9 a.m. and 12.30 p.m. Tenders will be returnable to the undersigned and no tender will be received except in a plain envelope, which must be sealed and must bear the words "Tender for Lighting Cables and Services, Great Cambridge Road," but shall not bear any name or mark indicating the sender.

The Council do not bind themselves to accept the lowest or any tender.

CYRIL E. C. R. PLATTEN,
Clerk of the Council.

Public Offices, Enfield.
May 23, 1951. (K 839)

CITY OF BELFAST

Electricity Dept.

PLANT, VICTORIA POWER STATION

TENDERS are invited for the supply, delivery, and erection of the following plant:—

(1) One 75-ton overhead electric travelling crane for Turbine House (Form of Tender No. N.1015).
(2) Two coal unloading cranes, each of maximum capacity 150 tons per hour (Form of Tender No. N.1036).
(3) Boiler feed pumps (four motor driven and one steam turbine driven), each to deliver approximately 320,000 lbs. of water per hour against a discharge head of 800 lbs. per square inch (Form of Tender No. N.1043).
(4) Band type circulating water screening plant, to deal with approximately 4,000,000 gallons of water per hour at a depth of 11 ft., 6 ins. (Form of Tender No. N.1037).

(*Continued in next column*)

(*Continued from previous column*)

Forms of tender, conditions, and specifications, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas in respect of each specification (cheques to be made payable to the Belfast Corporation Electricity Department), which deposits will be refunded provided bona-fide tenders be lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas per set, which sum will not be returnable.

Each tender, in quadruplicate, in sealed envelope marked "Tender for....., Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, June 22, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
May 25, 1951. (K 838)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

ASSISTANT PURCHASING OFFICER

APPLICATIONS are invited for the post of Assistant to the Divisional Purchasing Officer at these Headquarters. Applicants should have considerable experience of buying maintenance supplies, electrical and general engineering equipment as required for generating stations and transmission sections, together with a sound knowledge of internal purchasing procedure including trade inquiries, records, follow up and the organisation of stores.

The salary will be in accordance with Grade 4 of the National Joint Council Agreement (£510 to £570 per annum).

The post will be superannuable within the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, B.E.A., Barker Gate, Nottingham, and should be returned not later than June 13, 1951.

W. S. BURGE,
Divisional Controller.
(K 799)

BRITISH ELECTRICITY AUTHORITY

(1) DEPUTY POWER STATION SUPERINTENDENT, Kingston "A" and "B" Power Stations, comprising 128·75 mW. Applicants should possess the B.Sc. Degree or equivalent qualification, together with experience in the operation and maintenance of modern high-pressure turbine and boiler plant E.H.T. switchgear and the administration of a large power station with the control of labour. N.J.B. conditions of service and salary Class "G," Grade 3, £929 5s. p.a., including London allowance.

(2) INSTRUMENT ENGINEER, Littlebrook Power Station. Applicants should preferably have Higher National Certificate and experience in the maintenance, testing and calibration of all types of power-station electrical and mechanical instruments, and on boiler automatic control systems. N.J.B. conditions of service and salary Class "J," Grade 10, £689 9s. p.a., subject to confirmation by N.J.B. and including London allowance. Applications for (1), with names of three referees, should be addressed to the Divisional Secretary, B.E.A. S. Eastern Division, Lower Ham Road, Kingston-on-Thames. Applications for (2) on forms obtainable from the above named. Closing date June 9, 1951. (K 834)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER, CHESTERFIELD

APPLICATIONS are invited for the position of Shift Charge Engineer at the Chesterfield generating station.

Applicants should have had a sound training and considerable practical experience in power station operation. The possession of an Ordinary National Certificate in Mechanical or Electrical Engineering or its equivalent would be advantageous.

The salary is in accordance with Class "B," Grade 7, of the National Joint Board Schedule and the applicant will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishment Officer, British Electricity House, Barker Gate, Nottingham, and should be delivered to the undersigned not later than June 15, 1951.

W. S. BURGE,
Divisional Controller.
(K 793)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

STATION SUPERINTENDENT, ST. SWITHIN'S GENERATING STATION, LINCOLN

APPLICATIONS are invited for the position of Power Station Superintendent at the Lincoln Generating Station. Candidates should have a wide experience in the operation, maintenance and administration of an electricity generating station, and the possession of technical qualifications admitting to corporate membership of a recognised professional institution will be an advantage.

The terms and conditions of service will be those approved by the National Joint Board, and the salary will be in accordance with Class "F," Grade 1. The appointment will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and should be returned not later than June 15, 1951.

W. S. BURGE,
Divisional Controller.
(K 794)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:

STATION CLERK

Rye House Generating Station, near Hoddesdon, Herts.

The initial appointment will be in accordance with Grade 4 of the National Joint Council (Administrative and Clerical Grades) Salary Agreement (£510 by £20 to £570 per annum). The Station will have an ultimate capacity of 192 MW.

Applicants should have had wide experience in accounting work and administrative and clerical duties in a generating station and possession of an examination certificate, e.g. Institute of Cost and Works Accountants, will be an advantage.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience, qualifications and present position, should be forwarded in envelopes marked "Station Clerk" to the Divisional Controller, British Electricity Authority, Eastern Division Northmet House, Southgate, N.14, to arrive not later than June 8, 1951.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (K 821)

UNIVERSITY OF ADELAIDE

Department of Electrical Engineering

APPLICATIONS are invited for appointment as LECTURER IN ELECTRONIC ENGINEERING.

Salary range: £600-£50-£1,000 Australian. Commencing salary according to qualifications.

The original application must be sent to the undersigned, and one copy must be lodged with the Secretary, Association of Universities of the British Commonwealth, 5 Gordon Square, London W.C.1, from whom full particulars of terms of appointment and a statement about the Department of Electrical Engineering may be obtained.

Applications will close on July 31, 1951.

A. W. BAMPTON,
Registrar.

University of Adelaide,
Adelaide, South Australia. (K 833)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Central Sub-Area

DISTRICT COMMERCIAL ASSISTANT, ALLOA DISTRICT

APPLICATIONS are invited for the above appointment. Salary £450-£510 per annum. N.J.C. Agreement, Grade 3.

Applicants must have had a sound electrical training and practical experience in the running of a service centre and catering for all classes of industrial and agricultural developments and be able to tender for and supervise complete electrical installations.

Applications to be made in writing, with copies of testimonials, addressed to:

A. W. Andrews,
Manager,
Central Sub-Area,
Woodlands, St. Ninians Road,
Stirling. (K 755)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of COST ACCOUNTANT in the Board's No. 3 Sub-Area at Chester, at a salary within the range £705 to £795 per annum (N.J.C., Grade 7).

Applicants must have a sound knowledge of cost accounting and have passed the final examination of a recognised accountancy body. Experience in the electricity supply industry, although not essential, will be an additional qualification.

The appointment is superannuable, and may be subject to a medical examination.

Applications should be made on a form obtainable by written request from the Manager, No. 3 Sub-Area, Merseyside, and North Wales Electricity Board, Electricity House, Newgate Street, Chester, and must be returned not later than June 5, 1951.

JAMES RANKIN,
Secretary.
(K 831)

CROWN AGENTS FOR THE COLONIES

AREA SUPERINTENDENT required by the Government of Sierra Leone for the Electricity Branch of the Public Works Department for two tours of 18/24 months in the first instance. Salary, according to qualifications and experience, in scale £774, rising to £1,060 a year, including expatriation pay and temporary allowance. Outfit allowance £60. Free passages. Liberal leave on full salary. Candidates under 40 years must have served an appropriate apprenticeship and have had some years' practical experience in a responsible position on the erection, operation and maintenance of diesel engines in sizes ranging from 50 h.p. to 500 h.p. They must also have a good knowledge of the erection, operation and maintenance of 3-phase 4-wire 400/230 V overhead distribution system, the running of alternators and parallel and similar matters connected with the operation of public supply system. An Ordinary or Higher National Certificate is desirable.

Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M.28553.B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (K 750)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

STATION SHIFT CONTROL ENGINEER, AVON GENERATING STATION

APPLICATIONS are invited from suitably qualified engineers for the position of Station Shift Control Engineer at Avon Generating Station, Warwick.

Candidates should have practical experience in the operation of generating station switchboards.

The salary will be in accordance with Class "E", Grade 10 of the National Joint Board Schedule at a commencing salary of £488 per annum, and the appointment will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham and be returned not later than June 22, 1951.

W. S. BURGE,
Divisional Controller.
(K 870)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of SECOND ASSISTANT ENGINEER (Mains Construction), in the Central Sub-Area of the Board, based on Newtown Llantit near Pontypridd.

The successful applicant will be required to assist in the work of the Sub-Area Construction and Maintenance department. This department is responsible for the construction and maintenance of all 66 kV mains and most of the 33 kV mains in the Sub-Area, and also assists the District Engineers when requested with 11 kV and l.v. mains work. Applicants should have good experience of the construction of overhead lines of all voltages up to 66 kV.

Preference will be given to applicants who possess an Engineering Degree of a British University, the Higher National Certificate or its equivalent, or have passed the Graduateship Examination of the Institution of Electrical Engineers.

The salary for the position will be in accordance with Class "K" Grade 7 (£786/£804/£822) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than June 9, 1951.

D. G. DODDS,
Secretary.
(K 853)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of FIRST ASSISTANT in the Commercial Department of District 464 in the Eastern Sub-Area of the Board based on Abergavenny.

Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or its equivalent, and who have had experience in the commercial operations of a district.

The salary for the position will be in accordance with Class "A," Grade 5 (£495/£515/£535) of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than June 9, 1951.

D. G. DODDS,
Secretary.
(K 851)

CROWN AGENTS FOR THE COLONIES

FITTER LINESMAN required by the Nyasaland Government, Electrical Services Department, for one tour of 24 to 36 months with prospect of permanency. Salary according to age and experience in the scale £750 rising to £965 a year. Cost of living allowance between £20 and £126 a year according to salary and dependants. Outfit allowance £30. Free passages. Candidates must have had considerable experience of the erection, maintenance and testing of overhead distribution, up to 11 kV using steel and wood supports, and be able to carry out all overhead line work including tensioning, erection of switchgear, transformers, etc. A knowledge of underground cable work would be an advantage. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London, S.W.1, quoting M.28353.B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (K 820)

BRITISH ELECTRICITY AUTHORITY

(1) DEPUTY POWER STATION SUPERINTENDENT, Littlebrook 'A' and 'B' Power Stations, comprising 240 MW ultimate capacity 480 MW. Applicants should possess B.Sc. Degree or equivalent classification, have sound technical training and experience in the operation and maintenance of modern high-pressure turbine and boiler house plant, e.h.t. switchgear and the administration of a large Power Station. Initiative, good organising ability and experience in the control of labour essential. Class "J," Grade 3, £1,066 per annum, including London Allowance.

(2) MECHANICAL DRAUGHTSMAN (Pipework), Divisional Headquarters. Applicants should preferably have had experience of power station design and construction and be educated to Higher National Certificate standard. Salary within provisional range of £364 to £572 per annum. N.J.B. Conditions of service for both positions. Applications for (1), with names of three referees, should be addressed to the Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-on-Thames, and applications for (2) on forms obtainable from the above named, closing date June 9, 1951.
(K 862)

CROWN AGENTS FOR THE COLONIES

INSPECTOR OF WORKS (Temporary) (Distribution Section) (A) and INSPECTOR OF WORKS (Temporary) (Installation Section) (B) required by the Government of Sierra Leone for the Electricity Branch, Public Works Department for (post A) two tours of 18 to 24 months and (post B) one tour of 18 to 24 months in the first instance. Salary, according to age, of £936 or £975 a year (including allowances). Gratuity on satisfactory completion of contract. Outfit allowance £60. Free passages. Liberal leave on full salary. Candidates should not be over 40 years of age. For post (A) they must have served an apprenticeship in the distribution section of an electricity undertaking; have had extensive experience in the overhaul and repair of power transformers, h.t. and l.t. switchgear, etc.; have had some years of practical experience in the jointing of underground cables up to 11 kV; and be able to instruct others in correct cable-jointing procedure. For post (B) candidates must have served an apprenticeship with a large electrical contracting firm or in the consumers' engineers' section of an electricity undertaking and have held posts of responsibility in charge of wiring installations in buildings and workshops. A thorough knowledge of the Institute of Electrical Engineers' wiring regulations is essential and some experience of conduit installations would be useful. Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting for post (A) M.28554B, and for post (B) M.28557B, on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration.
(K 783)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments at salaries in accordance with the Revised National Joint Board Agreement:—

(a) MECHANICAL MAINTENANCE ENGINEER at Tir John Power Station, Class "G," Grade 6 (£707-£737 per annum).

(b) COMBUSTION AND EFFICIENCY ENGINEER at Tir John Power Station, Class "G," Grade 7 (£651-£679 per annum).

(c) JUNIOR ENGINEERS at various Power Stations in the Division. The commencing salary will not be less than £375 per annum, but the maximum of the grade will depend upon the classification of the station.

Applicants for these appointments should preferably have served a regular apprenticeship, and obtained the Higher National Certificate.

Applicants for (a) should have had sound experience in the operation and maintenance of h.p. and l.p. boilers and turbines.

Applicants for (b) should have had previous experience with large pulverised fuel boilers, and Bailey automatic combustion control.

Applicants for (c) should preferably have received a manufacturing works training.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below, to whom completed forms should be returned not later than June 16, 1951.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
May 24, 1951. (K 841)

MIDLANDS ELECTRICITY BOARD

Worcester and District Sub-Area

APPOINTMENT OF THIRD ASSISTANT DISTRICT COMMERCIAL ENGINEER

APPLICATIONS are invited for the above position in the Malvern district of the Worcester and District Sub-Area.

Applicants should have had a sound technical training with practical experience in the sale and installation of domestic and commercial electrical equipment and the wiring associated therewith. The duties would include advising consumers in respect of new supplies, extensions and alterations. Appropriate technical qualifications will be considered an advantage.

The appointment will be in accordance with N.J.B. conditions, and the salary, subject to negotiation, will be Class "A," Grade 10, £375 per annum. The successful applicant will be required to contribute to the Board's superannuation scheme if eligible.

Applications, stating age, experience and present salary, should be forwarded within 14 days to Mr. R. Mallet, Sub-Area Manager, Midlands Electricity Board, 88 High Street, Worcester.

A. STEPHENS,
Secretary.
May 22, 1951. (K 842)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

METER ENGINEER

No. 1 (Southall) Sub-Area Waterloo Road, Uxbridge, Middlesex. Provisional salary £880 per annum inclusive, subject to adjustment. N.J.B. conditions of service.

Candidates should be Corporate Members of the Institution of Electrical Engineers or possess equivalent qualifications. They will be required to administer and control the meter testing stations within the Sub-Area in addition to the workshops at Uxbridge. They must have wide practical experience in the design and operation of modern Class "A" stations dealing with all types of a.c. single and three-phase and d.c. meters, demand indicators, instruments, time switches and instrument transformers.

Candidates must be fully conversant with the planning, commissioning and operation of large bulk supply summation equipments, have a sound knowledge of the Electricity Supply (Meters) Act, 1936, with emphasis on practical experience in meter engineering.

Applications, on forms obtainable from the Sub-Area Secretary, 2/6 Windmill Lane, Southall, and returned to him not later than ten days after the appearance of this notice.

SENIOR SHOWROOM ATTENDANT

Bournemouth District of No. 4 (Bournemouth) Sub-Area. Salary in accordance with N.J.C. Grade 2 (£390 to £450 per annum). N.J.C. conditions of service.

Applicants should have experience in all showroom duties and a sound knowledge of domestic apparatus, sales procedure, application of tariffs and consumer service.

Applications, on forms obtainable from the Sub-Area Secretary, 1 Priory Road, Bournemouth, and returned to him not later than ten days after the appearance of this notice.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.
(K 845)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

POWER STATION SUPERINTENDENT
KEADBY POWER STATION

APPLICATIONS are invited for the appointment of Power Station Superintendent at Keadby Power Station, Nr. Scunthorpe. The station will have a capacity of 120 MW initially which will increase to an ultimate capacity of 360 MW.

Applicants should have had a wide experience in the operation and maintenance of large modern power station plant and have held a position of responsibility involving the control of technical and administrative staff.

Preference will be given to engineers who are Corporate Members of the Institute of Electrical Engineers and/or the Institute of Mechanical Engineers, or who hold the necessary qualifications for membership.

Conditions of service and salary will be in accordance with the National Joint Board Agreement (Schedule A), Class "G," Grade I, £1,039 to £1,119 per annum. The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds, 7, to whom completed forms should be returned within fourteen days of the appearance of this advertisement. Envelopes to be endorsed "Power Station Superintendent, Keadby".

G. A. VOWLES,
Divisional Controller
(K 819)

MIDLANDS ELECTRICITY BOARD

North Staffs Sub-Area

APPOINTMENT OF JUNIOR ENGINEER

APPLICATIONS are invited for the above appointment at the Headquarters of the above Sub-Area, 31 Kingsway, Stoke-on-Trent.

Applicants should have had some experience in distribution work and will be required to undertake duties in connection with technical records and calculations. Appropriate technical qualifications will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement and the salary will be Class "J," Grade 14, £460 to £478 per annum.

Applications, in writing, stating age, qualifications, experience and present salary, should be forwarded within seven days to Mr. H. A. P. Caddell, Manager, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS,
Secretary.
May 23, 1951. (K 843)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

ASSISTANT CHEMISTS

APPLICATIONS are invited for the following appointments in the Chemical Laboratory at Kirkstall Power Station, Leeds.

1. SENIOR ASSISTANT CHEMIST.

Applicants should hold a University degree in Chemistry or its equivalent and have had previous power station experience, preferably association with high pressure and pulverised fuel operation. Additional experience connected with atmospheric pollution, corrosion problems or condenser fouling will be considered advantageous.

Commencing salary, which should be regarded as provisional, pending negotiations with such organisations as are appropriate will be £909 per annum in accordance with Class "H," Grade 9 of the National Joint Board Agreement (Schedule A).

2. JUNIOR ASSISTANT CHEMIST.

Applicants should have had previous laboratory experience, preferably associated with fuel, water and oil testing and analysis. Preference will be given to those candidates holding Higher National or National Certificates in Chemistry and who are pursuing a recognised course of study.

Commencing salary which should be regarded as provisional pending negotiations with such organisations as are appropriate, will be £775 per annum in accordance with Class "H," Grade 17 of the National Joint Board Agreement (Schedule A).

The appointment will be subject to the provisions of the Authority's Superannuation Scheme, and to conditions of service as determined by the National Joint Board Agreement.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed with the titles of the position applied for.

G. A. VOWLES,
Divisional Controller.
(K 844)

LONDON TRANSPORT EXECUTIVE

APPLICATIONS are invited for a JUNIOR CHEMIST (Male) post in the Laboratory Service at the Executive's Generating Station at Greenwich.

Applicants should be in possession of the National Certificate in Chemistry or an equivalent certificate as a minimum qualification. Previous experience in the examination of coal and analysis of boiler feed water would be an advantage.

The salary for the post will be on a scale rising by annual increments to a maximum of £516 per annum, with additional payments for recognised academic qualifications, the commencing salary being dependent upon age, qualifications and experience.

The appointment is subject to a medical examination. On completion of a satisfactory probationary period of one year, the selected applicant would be expected to join a contributory superannuation scheme.

Applications, giving full details of age, training, experience and present salary, should be sent within 14 days of the appearance of this advertisemet to the Staff Officer (F.EV.178), London Transport Executive, 55 Broadway S.W.1. For acknowledgment, enclose addressed envelope.
(K 840)

EASTERN ELECTRICITY BOARD

Suffolk Sub-Area

APPOINTMENT OF THIRD ASSISTANT ENGINEER

APPLICATIONS are invited for the appointment of a THIRD ASSISTANT ENGINEER in the Construction Section on the staff of the Sub-Area Engineer at Finborough Hall, Stowmarket.

Applicants should have a sound technical training and experience in the construction of overhead and underground systems, including substations, at voltages up to and including 33 kV. Experience in the control of construction gangs, the programming of works and the preparation of progress reports is also essential.

The salary for the appointment will be in accordance with Class "H," Grade 10, of the National Joint Board Salary Agreement, commencing at £571 per annum.

Both the salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, technical qualifications and experience, with details of present appointment and salary, should be addressed to the Manager, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall Stowmarket, Suffolk, so as to reach him within 14 days of the appearance of this advertisement. (K 785)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Chilterns Sub-Area

Sub-Area Headquarters—Bedford

ENGINEERING DRAUGHTSMAN

Applicants should have had a good general and technical education in civil engineering work preferably with experience in the following: -

(a) Design, layout and construction of electricity substations.
(b) Reinforced concrete and steel structures.
(c) General building constructions.

The salary will be within the range of £400 to £600 per annum according to qualifications and experience.

Applications should be addressed to the Manager, Chilterns Sub-Area, Eastern Electricity Board, Prebend Street, Bedford.

Essex Sub-Area

Chelmsford District—Maldon Branch

COMMERCIAL ASSISTANT

Applicants must have had a wide practical experience and possess a good knowledge of electrical installation work appertaining to domestic, farm, commercial and industrial premises.

Preference will be given to applicants possessing the following qualifications:—

(a) Sound practical training.
(b) Experience in commercial development including hire purchase schemes.
(c) Ability to prepare wiring specifications and supervision of Service Centre and associated staff.
(d) Ability to drive a car.

The successful applicant will be responsible to the District Commercial Officer of the Chelmsford District.

The salary for this appointment will be in accordance with Grade 3 (£450 by £20 to £510) of the National Joint Council. Salary Agreement dated March 23, 1950.

Applications should be addressed to the District Manager, Chelmsford, Eastern Electricity Board, Anchor Street, Chelmsford, Essex.

Norfolk Sub-Area

Sub-Area Headquarters—Norwich

ASSISTANT TO COMMERCIAL ENGINEER
(Industrial Power)

Applicants, preferably Corporate Members of the Institute of Electrical Engineers, should have had a wide experience in the application and utilisation of electricity to commercial and industrial purposes. Experience should have been gained from within industry in addition to that obtained with Electricity Supply Undertakings. The successful applicant will be required to negotiate tariffs and conditions for supplies of electricity for industrial purposes, to give specialist advice on utilisation and to co-ordinate the development of power sales generally.

The annual provisional salary for the appointment will be £650.

Applications should be addressed to the Manager, Norfolk Sub-Area, Eastern Electricity Board, Duke Street, Norwich.

Future salaries and conditions of service for these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary should be submitted within 14 days of the appearance of this advertisement. (K 847)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the positions of FIRST ASSISTANTS to the District Commercial Managers in District 222 (Neath) and District 223 (Swansea) in the West Central Sub-Area of the Board.

Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or its equivalent, and who have had experience in the commercial operations of a District.

The salary for the positions will be in accordance with the National Joint Board Schedule for the Electricity Supply Industry as shown hereunder:—

(1) District 222, Class "E," Grade 5, £662/£678/£694.
(2) District 223, Class "F," Grade 5, £711/£724/£737.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than June 9, 1951.

D. G. DODDS,
Secretary.
(K 852)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the appointments of SUB-AREA ENGINEERS to fill vacancies which will occur in the near future in the Board's No. 1 and No 4/5 Sub-Areas.

No. 1 Sub-Area is based on Liverpool and is predominantly urban; No. 4/5 Sub-Area is based on Wrexham, North Wales, and is predominantly rural.

The salary offered is provisionally within the range £1,400 to £1,500 p.a. and subject to variation following negotiation with the appropriate staff organisation. Any variation in the salary offered would be in an upward direction only.

Applicants should have a good general and technical education and be Chartered Electrical Engineers, and have had considerable practical knowledge of the design, construction, operation and maintenance of a large distribution system, and have the ability to deal with the problems of organising the large staff associated therewith.

The appointments will be superannuable and subject to medical examination.

Applications should be made on forms obtainable from the Establishments Officer of the Board, Electricity House, Love Lane, Liverpool 3, and should be completed and returned so as to be received not later than June 15, 1951.

JAMES RANKIN,
Secretary.
(K 854)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of ASSISTANT MAINTENANCE ENGINEER (Electrical) at Necheils "A" and "B" Generating Stations. The salary will be in accordance with Class "J" Grade 9, of the National Joint Board Agreement, commencing at £646 per annum.

Applicants should hold the Higher National Certificate in Electrical Engineering or an equivalent qualification, should have had a sound technical training, and be well experienced in power station electrical maintenance.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Forms of application may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be submitted not later than June 16, 1951.

F. W. LAWTON,
Divisional Controller.
(K 850)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for five vacancies as JUNIOR ENGINEERS at Walsall Generating Station. The salaries for these positions will be in accordance with the National Joint Board Agreement in the range of Glass "G," Grades 10 and 14, £375 to £428 per annum.

Applicants should preferably have had experience in a large generating station, and duties will consist mainly of switchboard operation. The possession of Ordinary National Certificate or an equivalent qualification will be considered an advantage.

Conditions of service will be in accordance with the National Joint Board Agreement, and superannuation under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than June 16, 1951.

F. W. LAWTON,
Divisional Controller.
(K 849)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Edinburgh Sub-Area

APPLICATIONS are invited for the position of FIRST ASSISTANT DISTRICT ENGINEER, Grade "F.5," Salary £711 to £737 per annum.

The duties will consist of the operation and maintenance of an underground supply system, including l.t., a.c. and d.c. networks, 6·6 kV and 33 kV systems, substation plant up to 33 kV and converting plant. In addition, applicants will be required to plan and estimate for l.v. network extensions.

Preference will be given to applicants who have sound technical qualifications and suitable experience.

The position is superannuable and the successful applicant will be required to pass a medical examination.

Applications, in writing, stating age, education, qualifications, experience, and present position, should be received by the undersigned within 14 days.

G. T. ALLCOCK,
Manager,
Edinburgh Sub-Area.

Dewar Place,
Edinburgh 3.
(K 846)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 4 (Leeds) Sub-Area

THIRD ASSISTANT ENGINEER

(Meters, Testing and Protection) (Vacancy No. 64/51)

Applicants should be Corporate Members or Graduates of the Institution of Electrical Engineers or possess equivalent qualifications and should have a sound knowledge of automatic protective gear with some experience in the commissioning and maintenance of equipment. Experience of high voltage testing and high voltage cable fault location will be an advantage.

The successful candidate will be required to undertake standby duties for high voltage fault location.

Salary, N.J.B. Schedule, Class "K," Grade 10, £646 to £674 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Manor Farm, Bramhope, Leeds, within fourteen days of the appearance of this advertisement.

No. 1 (Bradford) Sub-Area

THIRD ASSISTANT DISTRICT ENGINEER

(Otley) (Vacancy No. 45/51)

Applicants should:—

(a) have passed the Graduateship Examination of the Institution of Electrical Engineers or hold recognised equivalent technical qualifications;

(b) have substantial experience in construction, operation and maintenance of high voltage systems, underground cables and overhead lines and substations, and medium and low voltage networks and;

(c) be prepared to reside within the District and undertake standby duties if required.

Salary, N.J.B. Schedule, Class "E," Grade 9, £519 to £531 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Road, Bradford, within fourteen days of the appearance of this advertisement.

No. 5 (Portsmouth) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER

(Castleford) (Vacancy No. 33/51)

Applicants must have had a sound practical training and considerable experience in the construction, operation and maintenance of h.v. and l.v. overhead and underground distribution networks, substations, plant and ancillary equipment. Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary, N.J.B. Schedule, Class "E," Grade 7, £579 to £609 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, within fourteen days of the appearance of this advertisement.

No. 7 (Grimsby) Sub-Area

SALES REPRESENTATIVE

(Gainsborough District) (Vacancy No. 14/51)

Applicants should have practical experience in negotiating with both urban and rural consumers in respect of new supplies and sales of domestic and agricultural equipments, and be competent to advise consumers on all types of domestic and agricultural installations, and prepare estimates in this connection.

Salary, N.J.C. Grade 1, £310/20/£390 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement.

No. 6 (Hull) Sub-Area

SECOND ASSISTANT ENGINEER

(Meters, Testing and Protection)

(Vacancy No. 61/51)

Applicants should have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers, and must have had experience of protective equipment on 66 kV, 33 kV, 11 kV and l.v. power systems. Experience of mains fault location will be an advantage.

The successful candidate will be expected to supervise installation work on the protective equipment on all the various power systems in the Sub-Area.

Salary, N.J.B. Agreement, Class "J," Grade 7, £736 to £770 per annum.

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(*Continued from previous column*)

THIRD ASSISTANT ENGINEER

(Meters, Testing and Protection)

Applicants should be Graduates of the Institution of Electrical Engineers or possess equivalent qualifications, and should have a sound knowledge of automatic protective gear with some experience in the commissioning and maintenance of equipment. Experience of high voltage testing and high voltage cable fault location will be an advantage.

Salary, N.J.B. Agreement, Class "J," Grade 10, £609 to £633 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, within fourteen days of the appearance of this advertisement.

May 25, 1951. K (855)

BRITISH ELECTRICITY AUTHORITY

PRINCIPAL ASSISTANT

Secretary's Office (Establishments) Headquarters

APPLICATIONS are invited for an appointment as a Principal Assistant in the Personnel Section of the Secretary's Office (Establishments) at the Authority's Headquarters in London.

The duties of the post relate to the recruitment and personnel administration of Headquarters staff, whose terms and conditions of service are governed by the National Joint Board Agreement and preference will be given to candidates with practical experience of its application. An engineering background would be an added qualification.

The salary for the appointment, which is superannuable, will be within Grade 7 of the National Joint Council (Administrative and Clerical) Grades, i.e. £740, rising by annual increments of approximately £30 to £835 per annum, inclusive of London allowance.

Letters of application, stating age and giving details of experience, qualifications and present position, should be forwarded to D. Moffat, Director of Establishments, British Electricity House, Great Portland Street, London, W.1.

The closing date for the receipt of applications is June 15, 1951. Please quote reference AE.176. (K 832)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of ASSISTANT ENGINEER (Mechanical Maintenance) at the St. Helens Power Station. Salary, Class "E," Grade 8, £550-£580 per annum, this grading should be regarded as provisional pending confirmation by the National Joint Board.

Applicants must have wide experience in mechanical maintenance of power station plant. Possession of the Higher National Certificate in mechanical engineering or equivalent qualification would be an advantage.

The appointment will be superannuable under the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme, and subject to a medical examination.

Forms of application may be received from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and should be returned not later than Friday, June 15, 1951.

A. R. COOPER,
Divisional Controller.
(K 848)

LEEDS COLLEGE OF TECHNOLOGY

Principal: C. Chew, M.Sc.Tech., F.R.I.C.

DEPARTMENT OF ELECTRICAL ENGINEERING AND PHYSICS

APPLICATIONS are invited for the post of full-time TEACHER of electrical engineering subjects, duties to begin in September next. Applicants should possess recognised technical qualifications and have had industrial and/or teaching experience.

Salary is in accordance with the Burnham Technical Report for Grade "A" Assistants: £375 by £18 to £630, together with allowances for training, industrial and/or teaching experience and war service.

Further particulars and form of application, to be returned within two weeks of the appearance of this advertisement, may be obtained by sending a stamped addressed foolscap envelope to the undersigned.

GEORGE TAYLOR,
Chief Education Officer.

Education Department, Leeds 1. (K 868)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

A MANAGER required for small electrical contracting business Ipswich. Must have sound knowledge of electrical contracting. Big opportunity for hard-working man (25-40) with initiative, capable of handling work at all stages from getting orders to rendering final bill. Applications treated in strict confidence. State experience, age, commencing salary.—Box No. 6083, Electrical Times. (K 807)

A VACANCY exists at the head office of the sales organisation of The General Electric Co. Ltd., in the Agricultural Department for a SALES ASSISTANT who has had some previous experience in this work. Applicants should have had a good general education and be in the age group of 25-30 years. Possession of a National Certificate in Electrical Engineering would be an advantage.—Apply in writing to the Staff Manager, Magnet House, Kingsway, W.C.2. (K 860)

APPLICATIONS are invited for the post of ASSISTANT INSPECTOR to the Ceylon Fire Insurance Association in Colombo. Applicants should have had comprehensive training in electrical engineering, embracing a five years' apprenticeship and general experience in installation work, particularly in connection with wiring for lighting and power, and possess a sound general knowledge of mechanical engineering and building construction. Candidates should be about 30 years of age, preferably single, well-educated and of good address.—Applications and inquiries should be sent to the Secretary, Fire Offices' Committee (Foreign), 65 Watling Street, London E.C.4. (K 814)

APPLICATIONS are invited from ENGINEERS for vacancies in a section responsible for scrutiny of new designs, modifications to cheapen manufacture, and the building of prototype heavy electrical switchgear. Fabrication or machining and assembly experience is necessary. Applicants should have appropriate production engineering experience, be familiar with cost analysis and preferably hold recognised technical qualifications.—Write, giving full details, quoting ref. 212A, to Central Personnel Services, 24-30 Gillingham Street, Victoria, London S.W.1. (K 812)

ASCO Ltd., are prepared to appoint SALES AGENTS for commercial refrigeration equipment in selected territories.—Asco Ltd., Refrigeration Division, Broadheath, nr. Manchester. (K 737)

CAPABLE DESIGNER required for our branch works, engaged in design and development of standard and special fractional h.p. motors of various types: a.c., d.c. and universal. Age 30-35, preferably with experience of production, to act as assistant to manager. 5-day week. Pension scheme.—Applications in writing, stating age, experience and salary required, to Personnel Department, George Kent, Ltd., Biscot Road, Luton, Beds. (K 873)

COLLEGE GRADUATES with B.Sc. degree or Higher National Diploma in Electrical Engineering required for two-year apprenticeship course. Suitable applicants may be eligible for permanent position after completion. Special consideration given to applicants who have been demobilised from H.M. Forces. State age, full details of scholastic training to Personnel and Welfare Manager, Lancashire Dynamo and Crypto, Trafford Park. (K 826)

COMPETENT TRANSFORMER TEST ENGINEER required. Duties include the testing of all types of power transformers to 2,000 kVA, preparation of test certificates and general physical inspection of transformers.—Applicants should be to H.N.C. standard and have had previous transformer test experience. State experience and salary to Lindley Thompson Transformers, St. Mary's Road, Slough. (K 782)

COURTAULDS LIMITED
Require a
DEPUTY CHIEF ELECTRICAL ENGINEER

at their Engineering Headquarters, Coventry. The Electrical Department is responsible for the technical supervision of installation and maintenance of all electrical equipment in the company's factories. Qualifications required: a wide knowledge and experience of electrical generation and distribution and its application to industrial uses. A Degree in Electrical or Mechanical Engineering and Corporate Membership of the Institute of Electrical Engineers is essential. Optimum age 40. Candidates should write for a detailed form of application to the Director of Personnel, **Courtaulds Limited**, 16 St. Martin's-le-Grand, London E.C.1, quoting the reference number B.88. (K 866p)

DESIGN ENGINEER required by successful old-established company in the North of England, engaged particularly in the manufacture of heavy duty d.c. switchgear. He should have scientific and commercial qualifications as well as practical experience, originality and initiative. He would have unlimited opportunity for developing his ability at a good salary, rising without limit according to his performance. To the right man the future prospects are bright.—Box No. 6079, Electrical Times. (K 805)

DRAUGHTSMAN required with experience on design and development of metal-clad switchgear up to 250 MVA at 11 kV. Good salary offered for suitably qualified applicant. Pension scheme available.—Reply, stating age, salary and full details of technical qualifications and experience, to Erskine, Heap and Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (K 833)

DRAUGHTSMAN, with experience of transformer manufacture, required by electrical engineering company in north-east London. Permanent position with superannuation scheme for suitable applicant. Good salary and working conditions.—Write, stating age, experience and salary required, to Box No. 6085, Electrical Times. (K 772)

DRAUGHTSMAN required with experience of electric wiring accessories or similar field. Interesting work on new developments with established company situated in S.E. London.—Apply, giving full details of experience, to Box No. 6085, Electrical Times. (K 809)

DRAUGHTSMEN, 20/30, with good basic training required for power-transformer work by established British company with expanding activity in Middlesex. Bonus and pension schemes.—Write, age, experience, qualifications and salary required, to Box No. 6059, Electrical Times. (K 759)

DRAUGHTSMEN AND ENGINEER DESIGNERS required, experienced in the layout of electrical switch and control boards, diagrams of connections or electrical control gear. Good remuneration for men of first class experience.—Apply, quoting "Switchgear", to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (K 699)

ELECTRICAL DRAUGHTSMAN required West Midlands, experienced low tension control gear layouts and diagrams. Must have good technical knowledge and preferably served apprenticeship in works. Good pension scheme, canteen facilities, five-day week with some overtime. State age, if married, present salary, and give references.—Box No. 6089, Electrical Times. (K 818)

ELECTRICAL DRAUGHTSMAN, familiar with light mechanisms or instruments and preferably with some circuit experience, required by Dowty Equipment, Ltd., Arle Court, Cheltenham, for their electrical development department. Age 21-25. Higher National Certificate preferred. The factory is ideally situated in the grounds of a country house and working conditions are excellent.—Write to Personnel Manager, stating age, experience and salary required. (K 872)

ELECTRICAL ENGINEER FITTER required for installation and maintenance of generators, switchgear, transformers, motors, etc., in Tanganyika. Good conditions.—Box No. 6087, Electrical Times. (K 817)

ELECTRICAL ENGINEERS FOR SERVICE IN INDIA. Applications are invited for appointments as resident engineers in the electricity supply undertakings controlled by Messrs. Martin Burn Ltd., Calcutta. Candidates must have had a sound technical training and practical experience in electrical engineering. Applications will only be considered from persons who have had a wide experience in the operation of modern generating stations and distribution systems, and in the control and management of electricity supply undertakings. Salary will be fixed in the grade—Rs. 1,600/- to Rs. 1,750/- per month. Generous allowances, contributory provident fund, and free medical attention are given in addition and in the case of married applicants, passages will be paid for wives and children. Selected candidates will be required to pass a medical examination. Initial contracts will be for four years on a renewable basis.—Applications, stating age and giving full details of training and experience, and accompanied by copies of not more than three testimonials, should be addressed, on or before June 15, 1951, to Messrs. Martin Burn Ltd. (London Agency), 71 Queen Street, London E.C.4. (K 815)

Assistant Electrical Engineer
required for work in connection with construction of new Generating Stations in the North West Area.

Applicants should preferably have experience of h.v. and l.v. switchgear, protective schemes, e.h.t. and l.t. cable layouts, lighting and power installations.

Applications should be in writing, giving full details of age, qualifications and experience, and should be addressed to: **Kennedy and Donkin, Post Office Chambers, 26 Brown Street, Manchester.** (K 867p)

FOR PAKISTAN

A well-known company in Pakistan, representing several reputable English manufacturers, requires an

ELECTRICAL SALES ENGINEER

normally for employment in Karachi. Age preferred: 22 to 28. Applicant must hold degree in electrical engineering or equivalent from a U.K. university, and have had two years' practical experience with an approved U.K. manufacturer. Preference given to man having training and experience with switchgear manufacture and estimating. Three years' agreement and six months' leave (with pay) from Pakistan if offered second agreement after termination. Initial kit allowance, £75. First-class passages. Monthly salary for single man, 1,100 rupees first year, 1,200 rupees second year, 1,300 rupees third year, plus local monthly allowance, 250 rupees. (Pakistan rupee at present worth approx. 2 2.) Additional allowance if married. Mutual contributory provident fund. Application must give full details of education, qualification, training and experience, and will be treated confidentially.

Apply Box No. 6031, Electrical Times.

(K 828p)

ELECTRICAL TESTER for Test Room. Must be experienced man with some technical training for rotating electrical machines up to 6 kW. Large variety of designs.—W. Mackie and Co. Ltd., 129 Lambeth Road, S.E.1. (Near Lambeth Bridge) (K 857)

ELECTRONIC ENGINEERS required by Airmec Laboratories, Ltd., Cressex, High Wycombe, Bucks, to be employed on interesting Government and commercial development work. Salary according to experience.—Write, giving full details, to Personnel Officer. (K 858)

FERRANTI LIMITED invite applications for senior appointments of Graduate Engineers with industrial experience in electrical measurements, particularly in electrical integrating energy metering both industrial and commercial, together with knowledge of testing equipment and facilities. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from Mr. R. J. Heobert, Staff Manager, Ferranti Limited, Hollinwood, Lancs. Please quote reference M.E. (K 744)

HOOVER LIMITED require an ENGINEER for the Time and Motion Study Department of their main works. Applicants should have had an engineering apprenticeship and at least five years' experience in speed and effort rating on every element. Some motion and methods study is involved.—Suitably qualified men are invited to write, giving full details of age, education, qualifications and experience, to The Employment Officer, Hoover Limited, Western Avenue, Perivale, Middlesex. (K 859)

ILFORD Limited Engineering Research and Development Department have vacancies for DRAUGHTSMEN in the following categories: (1) ELECTRICAL. Drawing office and workshop experience of power and lighting layouts is essential. (2) SERVICES. Experience in practical schemes for boiler plant, refrigeration and air conditioning is necessary. (3) MECHANICAL DESIGN. A wide experience with mechanisms of all types is required. Permanent and well-paid positions in good working conditions will be offered to competent men.—Write fully to Ilford Limited, P.O. Box No. 10, Romford, Essex. (K 768)

IMPERIAL CHEMICAL INDUSTRIES LIMITED invite applications for the position of JUNIOR SHIFT ENGINEER for boiler house control duties in the company's Weston Point Power Station, Runcorn, which has an installed capacity of 100 MW. Applicants, who should be between the ages of 25 and 30 years, should have had a sound practical training in mechanical engineering, hold a Higher National Certificate in Mechanical Engineering and preferably should have had some experience of the operation of large modern water tube boilers. Commencing salary £600 per annum. Successful candidates will be required to join the Company's superannuation scheme and to pass a medical examination.—Applications, stating age, qualifications, and giving full particulars of training, experience and position held, should be sent to the Staff Manager, Imperial Chemical Industries Limited, General Chemicals Division, Cunard Building, Liverpool, quoting reference EL/8. (K 856)

JUNIOR TEST ENGINEER for high voltage testing work. Age 20-25 years. Technical education to at least Ordinary National Certificate standard. Previous electrical testing experience necessary.—Write for interview, giving training and experience, to The Assistant Secretary, The Micanite and Insulators Co., Ltd., Empire Works, Blackborse Lane, E.17. (K 825)

LIGHTING SALES ENGINEER for North London fittings manufacturers. Preparation lighting designs, general internal administrative duties as assistant to Senior Lighting Engineer. State salary required. I.E.S. member preferred.—Box No. 6077, Electrical Times. (K 804)

LAMP WORKS FOREMEN. Expanding production requirements have created several vacancies in well-established lamp works in the north. Only men with good practical experience of modern lamp-making machines and techniques and ability to train and supervise flame setters, etc., should apply. Superannuation fund and full welfare, social and sports facilities are available, and housing assistance may be given if required. —Applications, with full details of experience, etc., to Box No. 6073, Electrical Times. (K 776)

MALES required as TESTERS on electrical measuring instruments. Experience desired, but not essential. Good opportunities for young men with National Certificate or equivalent. Write for interview, state age and previous experience, Sangamo Weston Ltd., Cambridge Road, Enfield, Middlesex. (K 682)

ONE senior and two junior RADIO OR ELECTRICAL ENGINEERS required by an American oil company for marine prospecting in Persian Gulf. Senior engineer to be aged up to 32 years, capable of taking charge of small crew of technicians, with experience of all types of radio communication equipment, preferably u.h.f. and some knowledge of motors and alternators. Junior engineers' qualifications similar, but less extensive. Three-year contract. Generous salaries and allowances, dependent on qualifications and experience.—Apply by letter, giving full particulars, to Central Mining and Investment Corporation Ltd., 1 London Wall Buildings, London E.C.2. (K 863)

OPPORTUNITY will shortly occur with British managed group of power stations in India for Senior M.I.E.E., or equivalent, experienced all branches power generation and distribution. Excellent remuneration and amenities will be offered to right man with probability of promotion to senior position at an early date. Age between 38 and 45.—Applications in writing to Box 4234, c/o Charles Barker and Sons Ltd., 31 Budge Row, London E.C.4. (K 835)

QUALIFIED ELECTRONIC ENGINEER is urgently required for the test and development departments of well-known automobile manufacturing company. Applicants should at least hold a H.N. Certificate Electrical Engineering and preferably a degree, also should have had some previous experience in the practical aspects of this type of work. Salary according to age, experience, and qualifications, with sound prospects.—Apply, Box No. 6043, Electrical Times. (K 715)

REQUIRED FOR MIDDLE EAST. All-round ELECTRICIANS, with experience in conduit and general electrical installation work, able to read drawings. A knowledge of cable and switchgear erection and overhead work would be useful.

(b) First-class PLUMBER JOINTERS with experience in jointing paper-insulated, lead-covered, and armoured cables up to 11 kV.

Free passage out and return, free quarters, messing, and medical attention. Leave granted and monthly salary. Apply, stating age and experience. Forward copies of testimonials or state names to whom we may apply.—Reply to Box No. 6049, Electrical Times. (K 718)

SALES ENGINEER required for (a) Yorkshire and North-east Coast and (b) London and Southern Home Counties by well-known medium voltage switchgear manufacturers with wide range of industrial and domestic fuse and switchgear, h.r.c. fuse links, o.c.b.s, switchboards, control panels, etc. Energetic representative will have good prospects on salary, expenses and commission basis. Give full particulars of present and past experience, in confidence.—Box No. 6081, Electrical Times. (K 803)

SENIOR DESIGNER-DEVELOPMENT ENGINEER for domestic and light industrial electro-mechanical control devices. Only men of proved experience and success in most modern practice need apply. First class opportunities for advancement.—Fullest particulars of qualifications, career to date and salary required, in confidence, to Box No. 6057, Electrical Times. (K 739)

SENIOR DESIGNS DRAUGHTSMAN required by old-established switchgear manufacturers in the Manchester district, to take charge of Development Section of Drawing Office. Must be fully conversant with all types of switchgear up to 250 MVA at 11 kV. Pension scheme available and good salary to the right man.—Reply, stating age, technical qualifications, full details of experience and salary required, to Box No. 6093, Electrical Times. (K 829)

SENIOR, Intermediate and Junior DRAUGHTSMEN are required by the English Electric Co. for expanding Drawing Offices at Stafford, Rugby, Bradford, Liverpool, Preston and London. These are permanent positions offering excellent prospects, and draughtsmen with reasonable mechanical, electrical or aircraft experience are invited to apply. The work is of a varied nature and applicants should give full details of their previous experience and technical training so that every endeavour can be made to fit candidates into the most suitable positions. —Replies, quoting ref. 133B, should be sent to Central Personnel Services, English Electric Co., Ltd., 24/30 Gillingham Street, London S.W.1. (K 822)

THE Brush Electrical Engineering Co., Ltd., has a vacancy for a DESIGN ENGINEER conversant with a.c. and d.c. motor control gear. Good experience of practical design and development on industrial or traction equipment is essential, with ability to initiate new designs. A Designer Draughtsman is also required to deal with similar work. Excellent opportunities for advancement are available.—Write, with full details of age, experience and salary required, to The Technical Director, The Brush Electrical Engineering Co., Ltd., Loughborough, Leics. (K 766)

WANTED by firm of Electrical Contractors COST CLERK, age over 25. Would consider disabled ex-service man. Salary in accordance with experience.—Apply, Box No. 6045, Electrical Times. (K 716)

WANTED for Nigeria, experienced ENGINEER to install, run and maintain 200 k.V.A Diesel sets, also transformers, power and lighting network, etc. Salary, £1,000 per annum minimum, depending on experience and qualifications.—Box No. 6095, Electrical Times. (K 837)

YOUNG EX-SERVICE MEN are invited to send details of their qualifications and experience to the Research Laboratories of the General Electric Company Limited, East Lane, North Wembley, Middx. There are a number of excellent opportunities at Wembley and Stanmore for young men with good educational backgrounds. Vacancies exist in many fields of research work and facilities are available for suitable men to continue their studies to degree or Higher National Certificate standard. Apply, in writing, to the Personnel Officer (Ref. GBLC/G/599), giving full details of age and experience. (K 827)

APPOINTMENTS FILLED

BOX No. 3091. OUTSIDE ASSISTANT ELECTRICAL ENGINEER. All applicants are thanked.

APPOINTMENTS WANTED

A.M.I.E.E., 35, REQUIRES CHANGE. Wide industrial and sales experience. Suitable sales manager, works liasion, technical representative or similar responsible position.—Box No. 6075, Electrical Times. (K 802)

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A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines), Service Electric Co. Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel.: 32996), electrical engineers and winding specialists. Distance no object. (F 739)

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A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co. Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

ENAMEL-COVERED copper wire, gauges 20-38 s.w.g.—Haddon Transformer Ltd., 27-35 Masons Avenue, Wealdstone, Middlesex (UND. 2070). (K 638)

STEEL, ALUMINIUM, BRASS, Sheets, Strip, Bars, Off-cuts. Any quantity—immediate payment.—Grades Sheared Metal Co., Ltd., Green Lane, Hounslow, Middx. Tel.: Feltham 3274. (K 675)

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WANTED, SCRAP ELECTRIC MOTORS, DYNAMOS AND CABLE. Top prices paid.—H. Reed, 36 Bridge Street, Leatherhead, Surrey. (K 11)

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WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

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100 KVA ALTERNATOR at 750 r.p.m. Three-bearing machine. 400 volts, three-phase 50 cycles, four wires, with switchboard. Box No. 6035, Electrical Times. (K 681)

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The above are available for inspection in Ireland. Please make enquiries or offers direct to:—

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Four Babcock and Wilcox Water Tube Boilers, each 25,500 lbs per hour M.C.R.; 250 lbs per sq in.; 700° F, with superheater, economiser, coal bunker, etc.

Various associated and auxiliary plant is included with these Boilers, together with one troughed belt conveyor, approximately 220 ft long, complete with motor, supporting steelwork, etc.

Full particulars and conditions of sale may be had on application to the Supplies Engineer at the Board's Central Stores, Lower Erne Street, Dublin.

Offers for this plant must be enclosed in sealed envelopes, endorsed "Tender for Strand Boiler House Plant," and must be delivered to the undersigned not later than twelve o'clock noon on Thursday, July 5, 1951.

PATRICK J. DEMPSEY,
Secretary.

Electricity Supply Board,
27 Lower Fitzwilliam Street,
Dublin.
May 23, 1951. (K 864)

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B.C.S. SWITCHGEAR.

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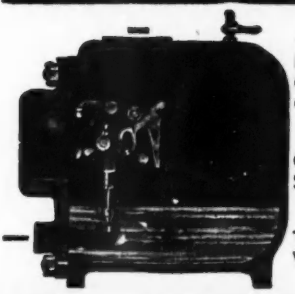

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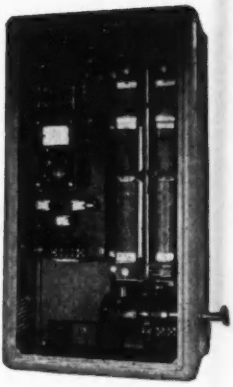

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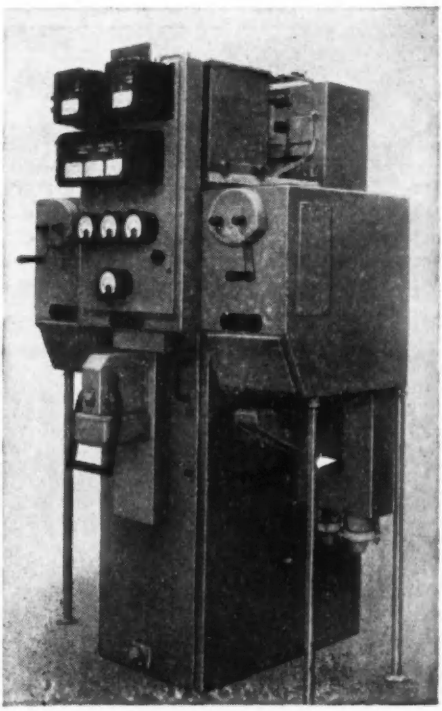

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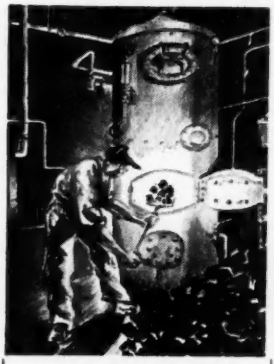

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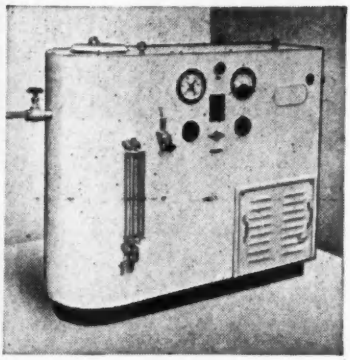

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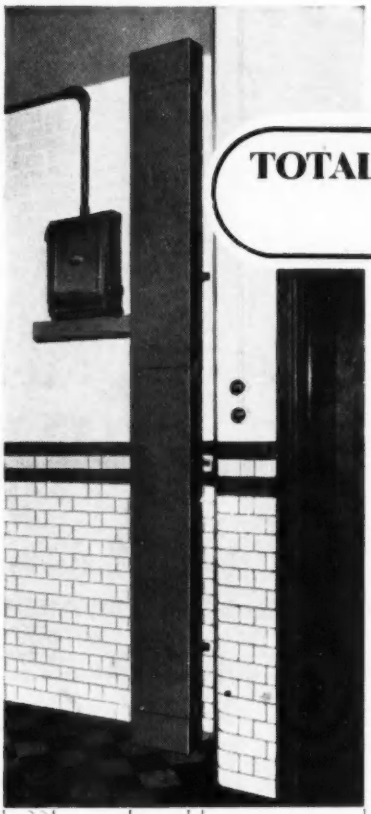

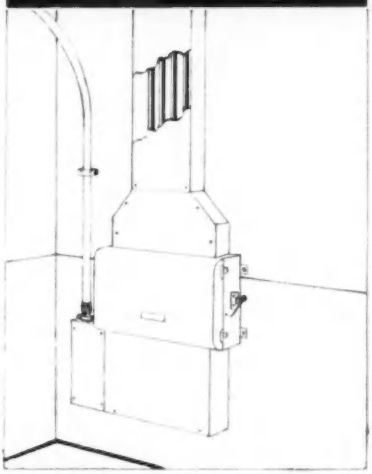

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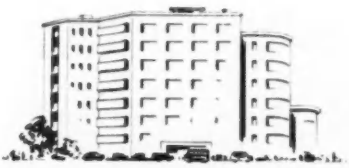

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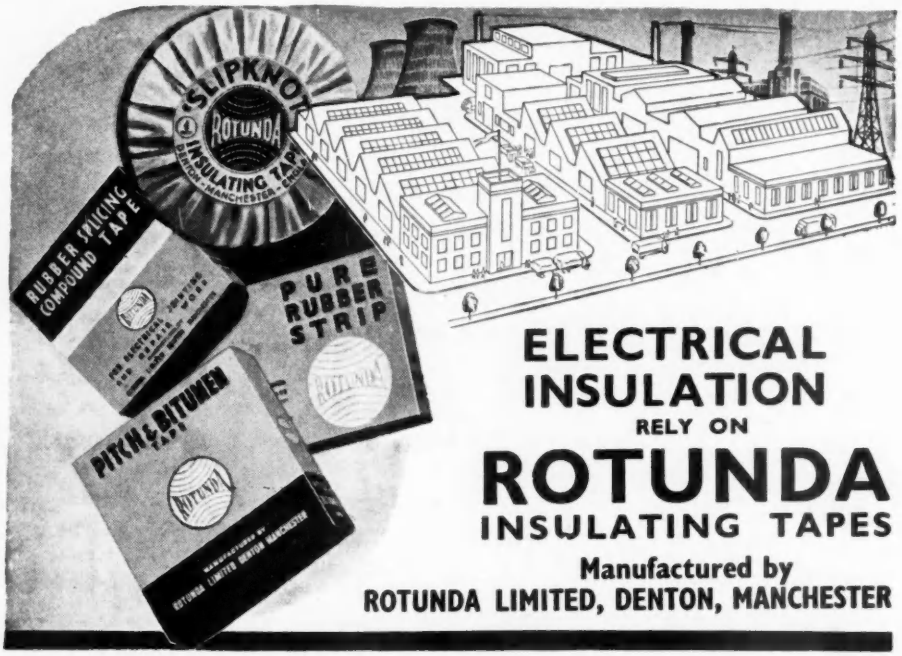

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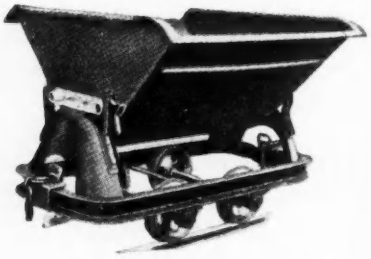

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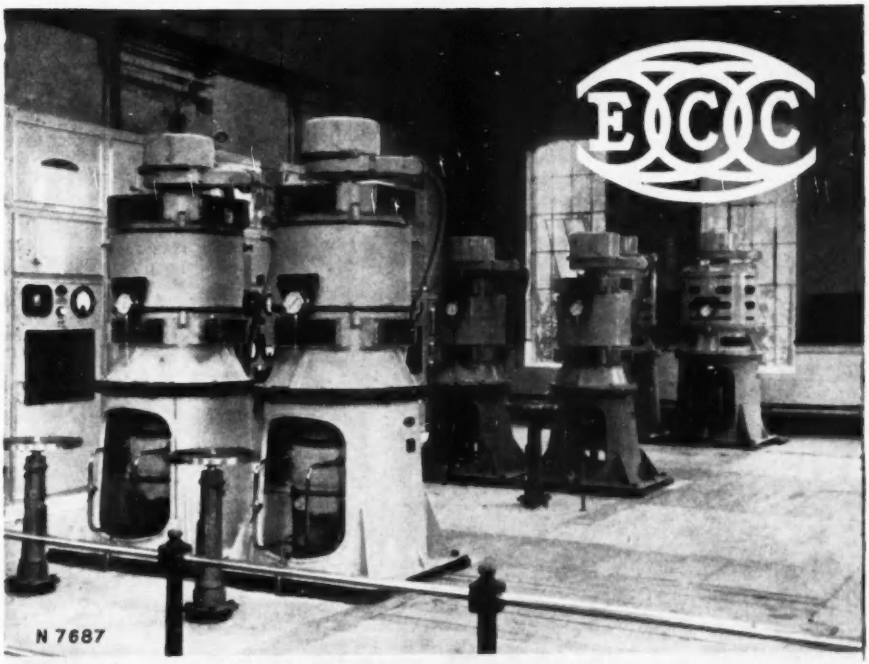

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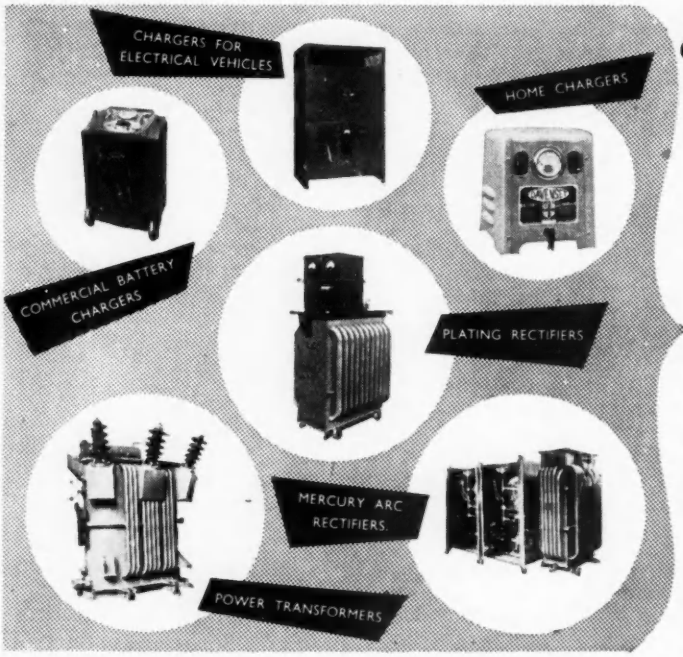

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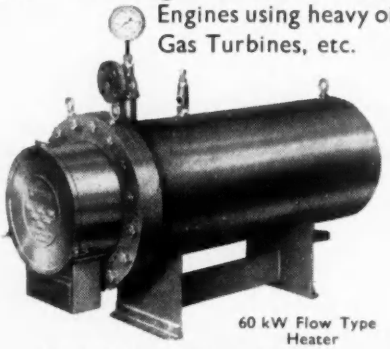

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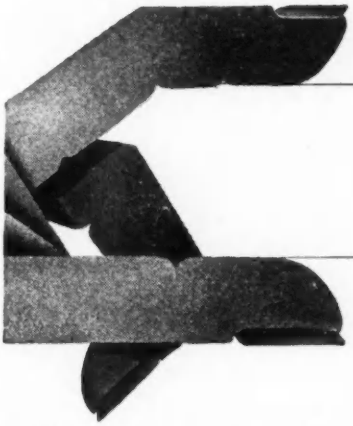

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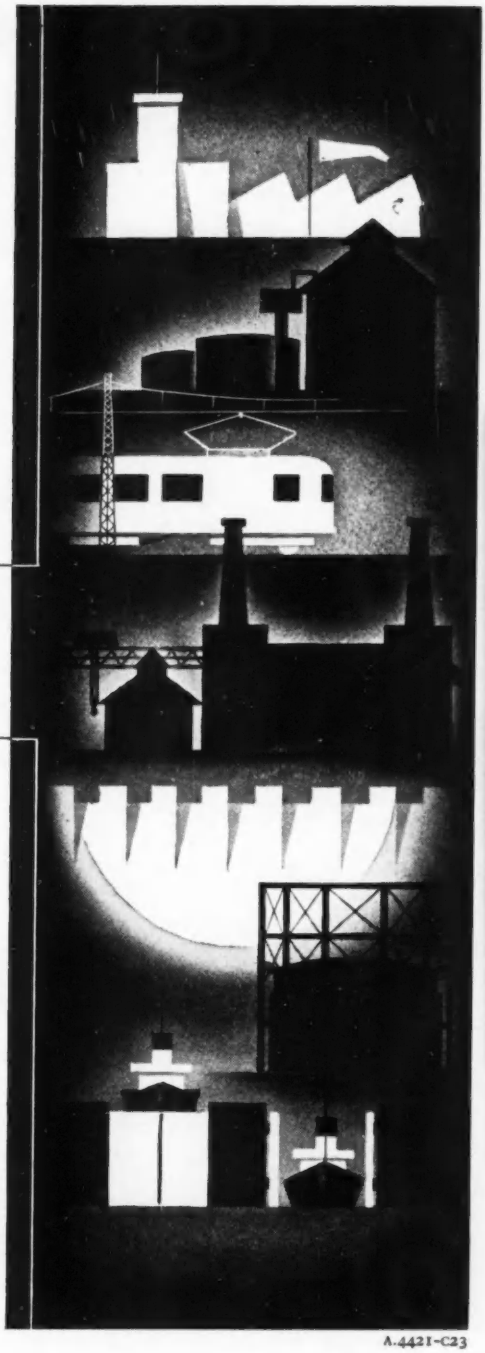

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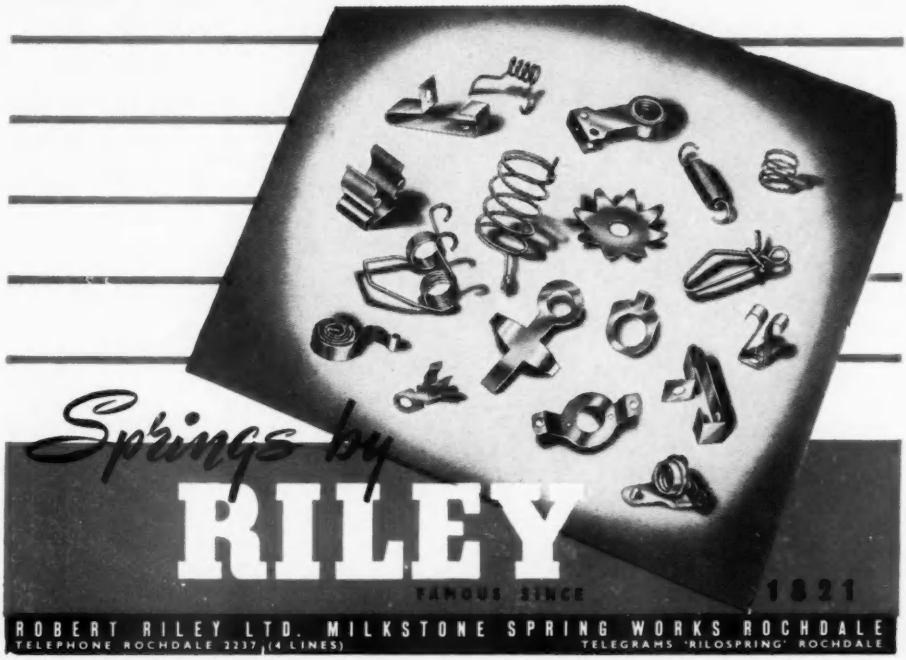

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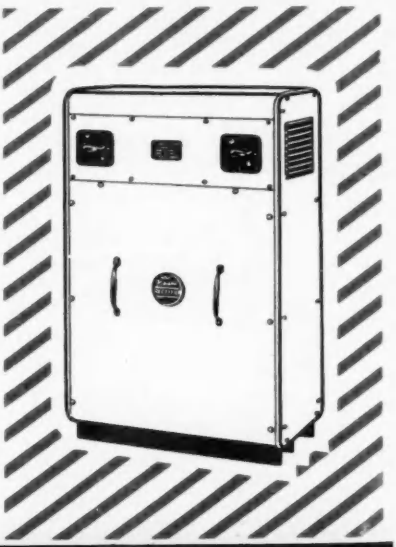
and

★ PROMPT DELIVERY



One of the BTH *Group*

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